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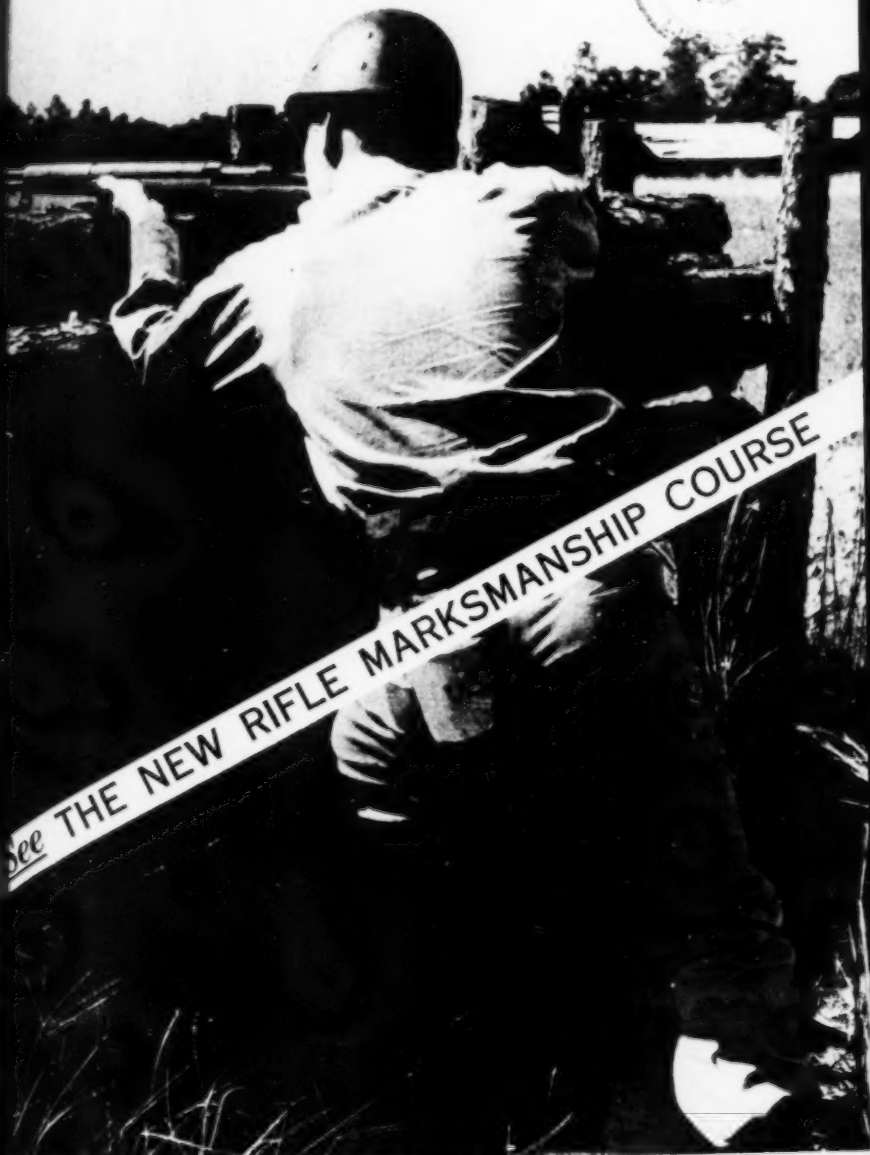

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TABLE OF CONTENTS

October 1949

Page

The New Rifle Marksmanship Course 5
Compiled by Maj. Louis R. Moore, Infantry

A New Concept in Company Administration 22
Compiled by Capt. Maurice W. Kendall, Infantry

Armored Personnel Carriers* 27
Compiled by Lt. Col. George B. Pickett, Jr., Cavalry

Morale on the March 42

Antitank Defense* 45
Compiled by Lt. Col. Russel O. Harris, Infantry

Small Arms Instructional Aids 61
Compiled by Capt. Frederick H. Black, Infantry

Technique of Instruction: The Lesson Plan 76
Compiled by Capt. Marvin J. Berenzweig, Infantry

Airborne Infantry Regimental Operations* 80
Compiled by Lt. Col. John N. Davis, Infantry

Attack on D'Horn 102
By Capt. Arvid P. Croonquist, Jr., Infantry

Roads, Drainage, and Mud Control 119
Compiled by Capt. James K. Polk, Corps of Engineers

Technique of Fire for Single Light Machine Gun on Bipod Mount* 131
Compiled by Capt. Frank A. Blake, Infantry

Rifle Company in a Night Relief 136

New Training Films and Training Literature 148

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The Infantry School
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The New Rifle Marksmanship Course*

Compiled by Major Louis R. Moore, Infantry

Yes, Lieutenant Instructor, there is something new in rifle marksmanship training—something that approaches the realism of combat.

During the last war, and before, any number of comments were made about the rifle course and methods of training men for combat. Let's list some of these: Why devote so much time to known distance firing and so little time—or none at all—to firing under combat conditions? Why fire the record course with the sling adjusted on the firer's arm when in combat he usually would not have the time or body position to use it? Why stress a perfect body position when in combat the rifle will be fired from many unconventional positions? Why use the round bull for sighting and aiming exercises and slow fire range practice, then change to the D target for sustained fire? Why? Why? Why?

How many of us actually saw a soldier using the sitting position in a fire fight? Then why lavish so much training time on this position? Why stress exact sight setting on the known distance range, devote so little time to the battle sight? In combat a soldier must fire at varying ranges, has not the time to re-set his sights for each shot—so why not allocate more time to teaching him the hold-off method? Why not adapt combat experience to the rifle marksmanship course?

These questions of yesterday are answered in the new rifle marksmanship course of today.

*EDITORS' NOTE: The New Rifle Marksmanship Course has been under study at The Infantry School for the past three years, and was field tested by the 82d Airborne Division, Fort Bragg, N. C. It is anticipated that it will be incorporated in an official training circular in the near future. A similar study was made on the AR, and an article on the New AR Course will be published in the INFANTRY SCHOOL QUARTERLY in the next issue.

Rifle qualification based on known distance firing alone led to overemphasis of this phase of training, neglect of the other phases. In the new course, accuracy is still stressed, but a knowledge of fire distribution is emphasized. Realism is injected by including transition firing in the qualification requirements. In this course, known distance firing is primarily for the purpose of developing confidence, accuracy, and "know-how" in the individual.

The new course has new targets (see Figures 1 and 2), using standard frames. The old A and D targets presenting different sight pictures, had unhandy target dimensions. Since adoption of the M1 Rifle, many riflemen have thought that targets should be designed with scoring spaces of proper dimensions to take advantage of the rear sight of the M1. The old targets are shown in Figures 1 and 2 for comparison with the new.

The D target is eliminated. Developed 38 years ago as a transition-type target, many variations of it have appeared in the intervening years. With the introduction of realism

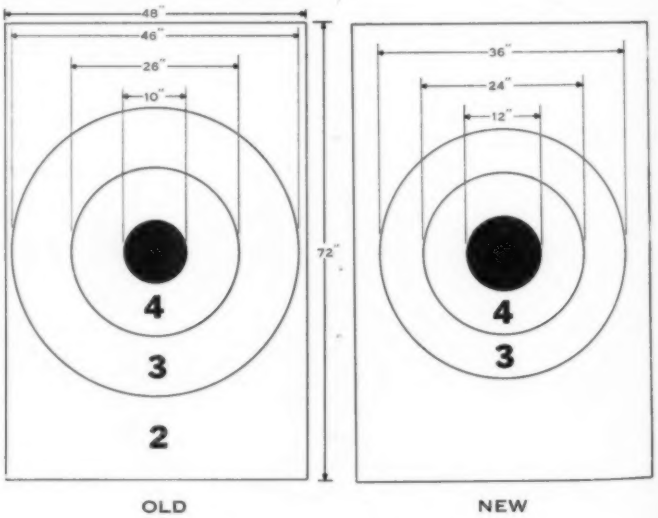

Figure 1. "A" Target.

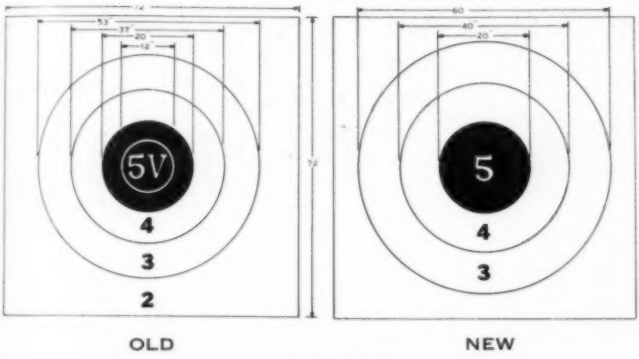

Figure 2. "B" Target.

in transition firing this target has lost its value. Moreover, it is undesirable in known distance firing because it does not teach the true sight picture. A round bull remains the superior design for teaching the correct sight picture.

Another disadvantage of the D target was the unequally spaced scoring areas that gave unwarranted value to low shots. Despite the fact that a ricochet in front of a target is often effective in scoring a hit, the soldier should not be presented in accuracy firing with a target that rewards him for shooting low.

The new A and B targets (refer to Figures 1 and 2) with the twelve and twenty inch bulls and concentric outer circles of six and ten inches greater radius respectively are decidedly better than the old A and B targets for training in sight adjustment. Those who have worked with the fractional measurements of the latter will realize the advantage of targets the dimensions of which are evenly divisible by 2 and 3 for the A target at 100, 200, and 300 yards, and by 5 for the B target at 500 yards. Since one click of windage or elevation moves the strike of the bullet one inch for each 100 yards of range, the firer may now make accurate sight changes without worrying about fractions of an inch in target dimensions.

The 2 scoring space is eliminated on the new targets, the increased size of the bull on the A and the 3 and 4 rings on the B compensating for the loss of the 2 area.

The following tables compare the scoring areas of the old and the new targets:

	Old A (*Sq in*)	*New A* (*Sq in*)
Area of 5 scoring space	78.6	114
Area of 4 scoring space	451.2	339
Area of 3 scoring space	1132.2	566
Area of 2 scoring space	1794	NONE
TOTAL scoring area	3460.0	1020

	Old B (*Sq in*)	*New B* (*Sq in*)
Area of 5 scoring space	314.16	314.16
Area of 4 scoring space	761.05	942.48
Area of 3 scoring space	1130.97	1570.80
Area of 2 scoring space	2977.82	NONE
TOTAL scoring area	5184	2827.44

The new targets change the qualification scores for known distance record firing—a phase we shall discuss later in conjunction with the scoring system for the new marksmanship course.

Let us now consider the course itself. It is designed to teach the fundamentals of precision firing and the use of the battle sight in shooting at field targets at various ranges from many unconventional positions. Upon completion of the course the individual is qualified for advancement to the team phase of rifle training in field firing.

Instruction practice on the known distance range consists of firing Tables I, II, and III at least once. (See Figure 3.) The amount of instruction practice is not limited to that prescribed in the tables; such additional practice may be given as time and ammunition permit. Riflemen are not permitted instruction practice in sustained fire until they have demonstrated proficiency in slow fire. Record practice consists of firing Tables IV and V once. (See Figure 3.)

RIFLE MARKSMANSHIP

Range	*Time*	*Rounds*	*Position*	*Target*	*Sling*
		INSTRUCTION PRACTICE			
		TABLE I—SLOW FIRE			
100	No Limit	9 Zero	Prone	A	Loop
100	No Limit	8	Prone	A	Loop
200	No Limit	9 Zero	Prone	A	Loop
200	No Limit	8	Prone	A	Loop
300	No Limit	9 Zero	Prone	A	Loop
300	No Limit	8	Prone	A	Loop
500	No Limit	9 Zero	Prone	B	Loop
500	No Limit	8	Prone	B	Loop
		TABLE II—SLOW FIRE			
100	No Limit	8	Standing	A	Hasty
200	No Limit	8	Squatting	A	Loop
200	No Limit	8	Kneeling	A	Loop
300	No Limit	8	Prone	A	Loop
500	No Limit	8	Prone	B	Loop
		TABLE III—SUSTAINED FIRE			
200	50 Sec.	9	Kneeling or squatting from standing	A	Loop
200	50 Sec.	9	Kneeling or squatting from standing	A	Loop
300	50 Sec.	9	Prone from standing	A	Loop
300	50 Sec.	9	Prone from standing	A	Hasty
		RECORD PRACTICE			
		TABLE IV—SLOW FIRE			
100	10 Min.	8	Standing	A	Loop
200	10 Min.	8	Kneeling	A	Loop
200	10 Min.	8	Squatting	A	Loop
300	10 Min.	8	Prone	A	Loop
500	12 Min.	10	Prone	B	Loop
		TABLE V—SUSTAINED FIRE			
200	50 Sec.	9	Squatting or kneeling from standing	A	Loop
300	50 Sec.	9	Prone from standing	A	Loop

Figure 3. Tables I through V.

A study of Tables I through V reveals that many changes have been made in the old marksmanship course. Let's analyze these changes to understand the reasons for them.

The old course included standing position firing at 200 yards; the new course provides for the standing position at 100 yards only. Combat experience revealed that little or no firing was done from this position at ranges greater than 100 yards unless some type of rest was used. Therefore, all firing from the standing position is now limited to 100 yards—a range at which the new A target gives exactly the same sight picture that is obtained with the sighting bar in preliminary marksmanship.

The sitting position has been eliminated because it was infrequently used in the war. It is an ineffective position for firing from behind cover and is not easily adaptable to the conformation of most men.

The method of zeroing in the new course requires the firing of three 3-shot groups, a sight adjustment being made after each shot group. Thus the "shot group" principle of the sighting and aiming exercise is applied as a definitely correlated step towards greater accuracy of sight adjustment.

The number of rounds fired at 500 yards has been increased by two, giving more weight to the firing at this important range. Sustained fire at 500 yards is not included in the course, since targets at this distance are indistinct, and a more careful and deliberate type of fire is required to accurately engage them. Furthermore, 500 yards is beyond the normal range at which a soldier will engage a target in combat with sustained fire.

Based on experience also, and to simplify timing, 50 seconds is now the time-limit for nine rounds of sustained fire. (The old time-limit was an unhandy 51 seconds.) This time is more than sufficient.

As stated earlier in this article, the D target has been eliminated.

This completes the known distance phase of the new course, upon completion of which the rifleman receives instruction in range estimation and the theory and use of

the battle sight at ranges up to and including 400 yards. Three hundred yards is the ideal for this sight; a bullet fired from the M1 Rifle with this sight setting will strike approximately seven and one-half inches above the point of aim at 100 yards, six inches above at 200, coincides at 300, 13 inches below at 400, and 49 inches below at 500 yards. The drop of 49 inches at 500 yards is too great for accurate estimation; therefore, the battle sight should not normally be used at ranges greater than 400 yards.

After the firer has been instructed in range estimation and "hold-off," Tables VI and VII (See Figure 4) are fired. Upon successfully completing these tables, the firer is then ready for fixed firing (Table VIII, Figure 4) from battlefield positions at controlled targets at unknown ranges, and quick firing (Table IX, Figure 4) at surprise targets.

To inject realism into this firing, the formal firing line has been abandoned and the men are now required to fire from behind various types of cover similar to those found on the battlefield. The loop sling is prohibited in this type of firing, since it is seldom, if ever, used in battle. The hasty sling, however, is permitted, as it is a more feasible sling for combat use. All firing up to and including 400 yards is done with the battle sight; beyond that range, sight setting is encouraged, but not required.

For firing Table VIII a target range of the type shown in Figure 5 is used. The order and sequence of lanes may be varied to conform to local terrain conditions, and the distances to targets in each lane may be varied from those pictured if local conditions so dictate. Each lane must be 25 yards wide at 500 yard range, but may be less than 25 yards wide at the firing line, depending upon local terrain conditions. The ranges shown in Figure 5 are approximate and may be varied, but overall distances must approximately equal the aggregates of the ranges shown in each lane. No range, except lane 6, will exceed 400 yards.

As in the old transition range, certain firing procedures are established. Since this table is fired for record, prescribed procedures must be followed. Certain permissible deviations will be discussed in their appropriate place.

INSTRUCTION PRACTICE

TABLE VI

Range	*Time*	*Rounds*	*Position*	*Target*
300	No Limit	16	Prone	A
200	No Limit	16	Prone	A
400	No Limit	16	Prone	B

TABLE VII

200	No Limit	8	Prone	E

NOTES: Tables VI and VII are fired on the known distance range.
Loop slings will not be used.
Use of the hasty sling is optional.
The battle sight will be used throughout.
No man will fire Tables VIII and IX until he has demonstrated his proficiency on Tables VI and VII.

INSTRUCTION AND RECORD

TABLE VIII

Lane	*Range (yds)*	*Time (sec)*	*Rounds*	*Target*	*Position*
1	150 & 275	60	4	E	Foxhole
2	200 & 350	60	4	E	Rubble pile
3	275 & 400	60	4	E	Stump
4	175 & 325	60	4	E	Window
5	225 & 350	60	4 (1)	E	Prone
6	500 &	60	4	B	Prone
7	125 & 400	60	4	E	Barricade
8	250 & 350	60	4	E	Ditch
9	175 & 325	60	4	E	Roof top
10	125 & 275	60	4	E	Log

(1) Eight rounds when fired for instruction practice.

Fired at least once for instruction practice and once only for record.

TABLE IX

Phase Line	*Range (yds)*	*Time*	*Rounds (1)*	*Target*	*Position*
1	15-35	a-3 sec	4	1 E	Shoulder or hip
		b-4 sec		2 E	
		c-3 sec		1 E	
2	15-35	d-4 sec	8	2 E	Shoulder or hip
		e-5 sec		3 E	
		f-5 sec		3 E	
3	15-45	g-4 sec	8	2 E	Shoulder or hip
		h-3 sec		1 E	
		i-5 sec		3 E	
		j-4 sec		2 E	

(1) Four additional rounds may be fired in any phase line.

Fired at least once for instruction practice and once only for record.

Figure 4. Tables VI through IX.

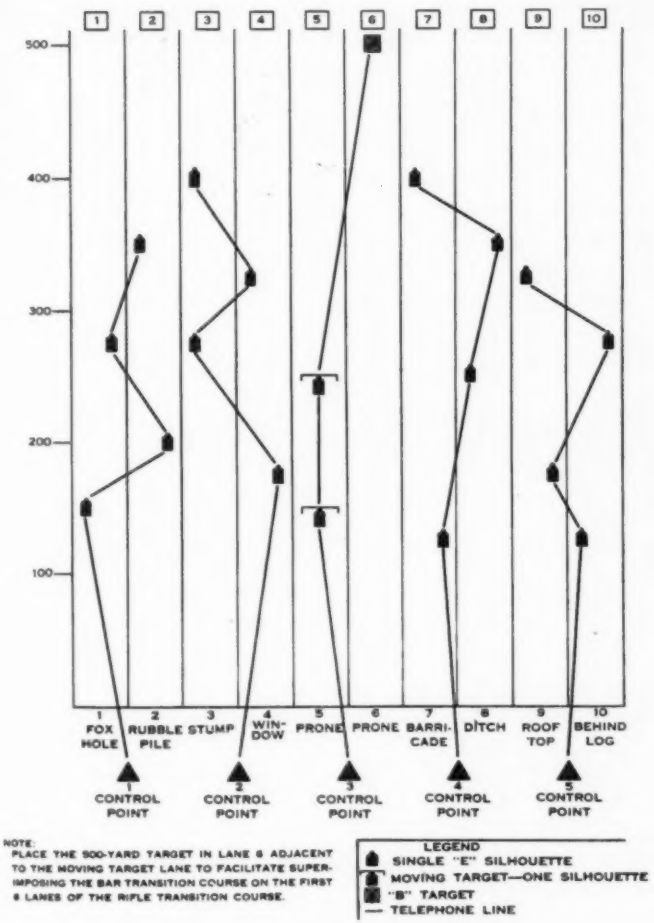

Figure 5. Diagram—Table VIII.

The positions used by the firer must conform to the principles of rifle marksmanship as taught in the known distance phase of the course, modified to the ground and type of support at each lane. Figures 6, 7, 8, and 9 show some of these firing positions. As previously stated, firing is done

without the loop sling, but the hasty sling may be used. The battle sight is used for all lanes except lane 6, where the firer estimates the range and may set his sights if he desires.

With the exception of lane 6, which has a 6′ by 6′ B target representing the front of a motor vehicle, "E" silhouettes are used in all lanes. The moving targets in lane 5 traverse right and left 30 feet, the direction of traverse differing for each of the moving targets fired on by any one man.

Figure 6. Position for Lane 9, Table VIII.

Each rifleman is allowed four rounds of ammunition for each lane. A maximum of two rounds may be used against the first target exposed in each lane, the exception being lane 6, where all four rounds are used.

Operating procedures at the firing line and in the pit are simple. A firer is lined up behind each firing lane, a qualified coach behind each lane. A firer is called up to each firing point and is issued four rounds of ammunition which he loads into his rifle. He assumes the firing position prescribed for that lane. The coach signals the control point to

Figure 7. Position for Lane 2, Table VIII.

Figure 8. Position for Lane 3, Table VIII.

have the pit operators display *either* of the two targets for that particular lane. The firer engages his target which, if hit, is twirled and lowered at once, and the control point has the other target for that lane raised immediately. If the firer fails to hit the first target with his second round, that target remains exposed for one minute and is then lowered without being twirled. The firer then engages the second target, which is raised immediately upon command from the control point and operated in the same manner as the first one. At completion of firing in one lane, the firer moves to the next higher numbered lane, the firer at lane 10 moving to lane 1. This procedure is continued until each man has fired all 10 lanes, the coach scoring the firer in all lanes except 6, in which lane all 4 rounds are fired at the B target, hits within the diameter of the 3 ring being scored by the pit operators and reported to the coach through the control point phones.

Figure 9. Position for Lane 8, Table VIII.

Firers are required to search for the targets in each lane; thus the sequence for exposing the targets is not fixed but is varied on orders of the control officer. All exposed targets must be plainly visible from the firing position.

Listed below are the scoring points for all lanes:

Lanes 1, 2, 3, 4, 5, 7, 8, 9, and 10 per hit	5 points
Per unexpended round if both targets hit	5 points
Possible per lane	20 points
Lane 6 per hit	5 points
Possible per lane	20 points
Possible for Table VIII	200 points

(Ricochet hits will be scored as hits)

After successful completion of Table VIII for record, the rifleman is ready for quick fire at surprise targets (Refer to Table IX, Figure 4.) This table is fired at least once for instruction but only once for record.

A field range of the type shown in Figure 10 is used for this firing. The number of lanes may be such as local conditions allow and safety will permit. The greater the number of lanes, however, the less time is required to run this phase of the course.

The firing is done at surprise targets at varying ranges, the firer being permitted to fire either from the hip or the shoulder, but it is well to point out here that a soldier on the alert and ready to engage the enemy at close quarters should never carry his rifle at the hip position. He should carry it in a position of readiness (see Figure 11) from which he can fire from the shoulder *or* the hip. Hip firing should be used in combat only when the soldier is suddenly confronted by a target less than 25 yards away, and when he is unable to get off an aimed shot from the shoulder. Therefore the use of hip firing at ranges in excess of 25 yards is not taught or permitted.

Use of the sling is prohibited in this table. Firing procedure for the table is as follows:

All targets are counterbalanced disappearing targets consisting of one or more E silhouettes. A single silhouette represents an enemy rifleman, a double silhouette, an

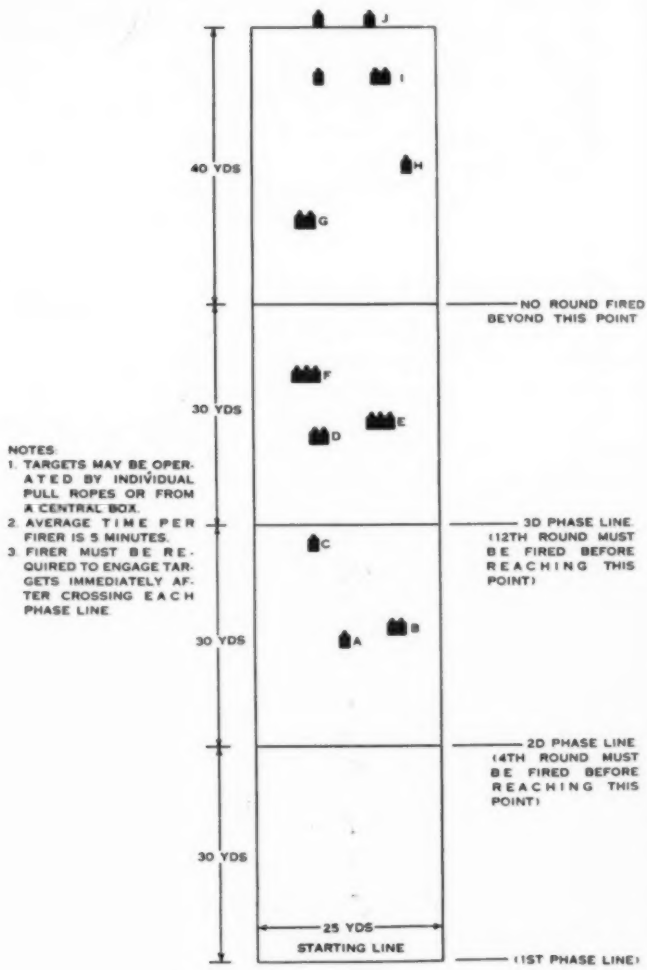

Figure 10. Diagram—Table IX.

automatic rifle team, and a triple silhouette represents a machine gun. These targets are exposed in sequence on signal of the control officer. The signals, of course, are neither audible or visible to the firer.

Phase lines are marked as shown in Figure 10. These permit the rifleman to reload and are of assistance in enforcing safety regulations.

The firer starts from the prone position, rifle cocked, 8 rounds in the rifle and two 8-round clips in his belt. Upon signal from the officer in control of the lane, the firer rises

Figure 11. Alert Position, Table IX.

and moves down the lane on the alert. As the targets are exposed, the firer shoots one round at each E silhouette from the off-hand (shoulder) position, or from the hip position if under conditions that permit it. After engaging each target, the firer resumes the alert position.

The control officer accompanies each firer to insure control and compliance with safety regulations. A coach assists this officer and helps to critique the firer when his firing is completed. The average time for a firer to run this course is 5 minutes. This table is fired at least once for instruction and only once for record. The scoring is listed below:

Per E silhouette	5 points
Per unexpended round if all silhouettes hit	5 points
Possible for Table IX	120 points

(Ricochet hits scored as hits)

This completes the new rifle marksmanship course as far as the individual tables are concerned. But there still remains the important item of scoring. Several scoring methods were suggested when this course was originally designed. A balance was struck between the three types of firing —known distance (Tables IV and V) transition fixed fire (Table VIII) and transition quick fire (Table IX). A maximum value of 300, known distance, 200 fixed fire, and 120 quick fire was assigned to the three phases of the course as being an equitable distribution of values.

No attempt, however, should be made to compare these scores with those of the old course. The substitution of the A for the D target in sustained fire will reduce the scores in known distance firing. Also, fixed firing from battlefield positions with the battle sight is extremely difficult—fifty per cent hits will prove a high average.

The qualification scores were therefore fixed at:

Expert Rifleman	450
Sharpshooter	360
Marksman	300

An individual's qualification score is obtained by adding his scores in each of the three phases. For example, a man firing 230 in Tables IV and V, 140 in Table VIII, and 80 in Table IX has a total of 450—Expert Rifleman. But to obtain such a classification requires a top performance in at least two phases and a good performance in the other. If a soldier fails to make a good score in any one phase, he cannot make Expert regardless of what his other scores may be.

In conclusion, Lieutenant Instructor, the following is a recommended allotment of training time for the new rifle marksmanship course: 4 hours mechanical training; 24 hours preparatory training period; 32 hours instruction and record practice on the known distance range; 4 hours preliminary marksmanship on hold-off and firing without the loop sling; 6 hours for firing Tables VI and VII; 16 hours for firing Table VIII; and 4 hours for Table IX. And as one last suggestion, the firing of Tables VIII and IX can be done in conjunction with the firing of the new AR course by alternating one-half of your men between the two ranges —provided the same area is not used for both weapons.

A New Concept In Company Administration

By

Captain Maurice W. Kendall, Infantry

Since expansion of the Army from its pre-war strength, thousands of officers have had the privilege of serving as company commanders. That it is a privilege, no conscientious officer will deny—yet many of these officers will privately admit that they eventually reached the conclusion they were not commanders in the real sense of the word, but administrators presiding over a maze of paperwork and the minutiae of company housekeeping. "Hell, I know I'm responsible for this sort of thing," they say with an almost universal sameness, "but for God's sake give me somebody to take care of the *details*."

Somebody to take care of the details. Well, what about the company executive officer—what's he for? What about the first sergeant and the company clerk—can't they do it? And what about those platoon leaders—they make good bond officers, insurance officers, supply officers, mess officers, investigators, agent finance officers, personal affairs officers, letter writers, decorators, and chart makers.

The answer, of course, is that these people *have* been taking care of it, with the active and frequently manual participation of the company commander. In theory the system is supposed to work, and obviously it does work after a fashion; we administered and trained an army of 8,000,000 and the end result was victory everywhere.

There are some competent men, though, who believe that the old way of doing things is not good, who have the audacious opinion that we may possibly, just possibly, have

trained an army in spite of it. What good purpose is served, they want to know, by inflicting upon the company commander and his officers the detailed management of a multitude of administrative tasks, with the almost inevitable result that they have little time for creative thought.

Little time for creative thought. Perhaps this is the one thing we can clearly and truthfully delineate as bad. Little time to think. Too often mediocrity in training is the fault of time-consuming administration. What company officer has not angrily found himself ill-prepared to instruct his men because he *simply did not have the time to plan?*

What would seem to be needed, then, is someone to manage—actively manage—the many-faceted administrative affairs of a company so that the commander and his officers may allocate a larger share of their time and thought to the tactical operations of the unit.

The prayers of company commanders appear to be answered in Department of the Army Circular No. 25, 1949, which announces the establishment of the unit administrative career warrant officer, who becomes the principal administrative assistant to the company commander with authority to sign routine documents in the name of that officer. This warrant officer may be assigned such additional duties as the commander desires—mess officer, supply officer, and so forth—and is the company liaison with the battalion or regimental personnel officer. Department of the Army Circular No. 79, 1949, authorizes the inclusion of the unit administrative career warrant officer in those T/O & Es affected by the change—that is, all company size units of the infantry division and those units of similar size in the other combat arms. At this time, however, actual reorganization of these units can be accomplished only by specific authority of the Department of the Army. First must come the screening, selection, and procurement of persons qualified to fill these positions, this to be followed by a period of intensive training to further qualify them for the important posts they are to hold.

And what, the reader may immediately inquire, becomes of the first sergeant? Is he relegated to the junk pile, his

usefulness over? Is he divested of his powers? The answer is neither. The first sergeant will now appear more frequently on the training field, where he can come to know the actual abilities of the men. No longer will his estimate of them be based on orderly room contact only, often a misleading thing when recommending promotion. He will become a "strawboss" in fact as well as name, and as such will retain responsibility for certain status reports— the morning report, the sick book, and the duty roster. But he is no longer charged with running the orderly room, and his relations with the warrant officer—and of the warrant officer to him—are intended to be mutually cooperative and not a matter of "who ranks who around here."

And the company executive officer? That individual is freed almost entirely of administrative detail. Like the first sergeant he will become a familiar sight on the training field. He becomes an *executive* in the true meaning of the word, relaying the commander's orders, devising ways to carry them out, and seeing that they are done.

As for the platoon leaders, they are now responsible only for their platoons. Certainly there is no objection, if a commander decides to broaden their administrative experience, to assigning them additional duties. But obviously such tasks can now be coordinated in such a way that they do not interfere with the platoon leader's primary responsibility.

No, the company commander has not shed one iota of responsibility. If under this system his administration goes sour, the fault is still his in the eyes of his superiors. What he *has* shed, though, are those long unprofitable hours spent in close examination of *detail*. He must still concern himself with administration but he is free of the spadework—the warrant officer is his administrative technician.

Very clearly indeed this warrant officer is going to have to know his business—his qualifications must range from a thorough knowledge of Army clerical, personnel, and administrative procedures, including a grasp of the regulations governing accountability, responsibility, and supply—to a sound comprehension of the Army Food Service Pro-

gram as applicable to company messes. As stated before, a screening process followed by a period of intensive schooling will provide men of the highest qualifications for these positions.

This new system has been tested and found good. The Infantry Center, by direction of the Department of the Army, conducted the experiment. The following facts and statistics, greatly condensed and high-lighted here, are based on the board report of that experiment:

1. Company commanders who formerly spent an average of 22 hours per week on administration were able to reduce that time to 8 hours.

2. Executive officers were relieved of all company-level administrative duties.

3. First Sergeants who previously spent an average of 24 hours per week at administrative tasks were able to reduce this time to 10 hours, most of it being given to the preparation of morning reports, sick reports, duty rosters, and passes.

4. Company mess officers who spent approximately 8 hours weekly on mess supervision were returned to full-time duty with their platoons, the warrant officer relieving them. Company supply officers who spent 12 hours per week on supply were likewise relieved by the warrant officer and returned to their platoons.

5. The general opinion of the board is that all aspects of company administration and operations are materially improved by the inclusion of a warrant officer in the tables of organization.

This is a new concept in company administration, and there are, of course, some points which bear checking on. One of these is the attitude of the first sergeants. In the tests at the Infantry Center the following report was made with respect to this point: "The first sergeants of the units engaged in the tests did not feel that there had been any infringement of their prerogatives. Neither they nor their company commanders felt that the assignment of the warrant officers had conflicted or interfered with their professional relationship." This we can find highly understand-

able, since the first sergeant is no longer figuratively a prisoner of the orderly room.

One more bonanza: The company clerk, that stranger who inhabited the regimental personnel office, will return to the company for full clerical duty and will additionally perform the tasks of the mail orderly, a cancelled position.

SUMMARY

This new concept of company administration is logical, and from preliminary tests it is practical. Its advantages are manifest and manifold. Its ultimate success, however, as does success in any company endeavor, depends on the company commander himself. He must not view the arrival of his unit administration career warrant officer as the signal to forget administrative responsibility.

Armored Personnel Carriers

Compiled by Lt. Col. George B. Pickett, Jr., Cavalry

Military imagination can foresee tanks and infantry penetrating deep into far flung continents that for centuries have been linked only by the most primitive of roads. How will the infantryman get there? Will he walk? Or can he be protected and delivered to any corner of the battlefield to fight side by side with the tank?

A gratifying answer to these questions lies in the development of armored personnel carriers since the end of World War II. This development has been dictated by the need for cross-country mobility equal to light tanks, automatic fire power while on the move, and all-around protection against small arms and overhead artillery bursts.

Today, this progress is exemplified in the high speed, armored, cross-country personnel carrier. It promises to guarantee the movement of infantry to the assault position with the same speed as the tank.

This is a far cry from the first modern armored personnel carriers with their limited half-track mobility, light armor and armament, and exposed open tops. Their development since the Nazi Panzer Divisions used them on the good roads of western Europe is a significant chapter in the evolution of the offensive.

Like the tank, the modern armored personnel carrier is a by-product of the internal combustion engine and the offset crankshaft. Around 1934 the Germans developed the Panzer (Armored) Division to exploit break-throughs similar to those achieved by Hindenburg in March 1918. During the development of the panzer division prior to 1939, they discovered that panzer (tank) units could overrun the enemy but that a highly mobile infantry unit was needed in the panzer division to mop up, consolidate objectives, and

hold the ground gained. To provide this infantry with the necessary battlefield mobility, it was mounted in armored half-tracks. When the 6th U.S. Infantry was reorganized into the 6th Armored Infantry in 1940, it was equipped with armored half-tracks—the principle armored personnel carrier used by both Allied and German forces in World War II.

WORLD WAR II EXPERIENCE

Two significant facts are evident from a study of Allied and German experience with armored personnel carriers during World War II. First, the half-tracks did not have the same cross-country mobility as a tank. To perform his mission, the armored infantryman must be able to accompany a tank unit anywhere on the battlefield. To accomplish this, he needs a vehicle having comparable mobility with the tank. The second significant fact now realized is that the armored personnel carrier needs overhead protection from air bursts. Although the American Army introduced the VT fuze to warfare, it can expect to encounter a like weapon in possession of the enemy in any future war. However, even if the enemy does not possess a VT type fuze it still is desirable to have overhead protection since it enables our armored infantry to advance closer behind their supporting fires. There were many cases in World War II where tank-armored infantry teams followed their supporting fires so closely that the armored infantry suffered casualties in the half-tracks from these friendly fires. Yet these losses were negligible compared to what they would have been if the supporting fires had not been followed as closely. Obviously, a carrier with overhead protection would have reduced losses of that type.

German experience with half-tracks was similar to our own. We have already seen that the half-track does not have the same degree of cross-country mobility as the tank; but the Germans did not realize the full implication of this deficiency until too late. The overwhelming successes of the Panzers, supported by the half-track borne Panzer Grenadiers, appear to have startled the Germans as much

in May and June 1940 as it astonished the British and the French. However, one condition materially assisted the Germans—the thorough adequacy of the all-weather hard surfaced roads in western Europe. Since the rapid advances of the Panzer Divisions were made on these roads, the half-track's lack of cross-country mobility did not make itself evident to the Germans, and they did not visualize any corrective measures at that time.

This carrier's lack of cross-country mobility first became apparent when operation "BARBAROSA" crossed the old Polish-Russian frontier in July 1941. During the early phases of the offensive into Russia in 1941, the Germans found conditions favorable to their Panzers. However, as soon as the roads of Poland were passed and the roads, or lack of roads, of Russia faced the Nazi armies (most of them existed only on the map) the half-track presented a serious problem. It was found that the full-tracked vehicles, the tanks, could cross the wet sand and gumbo mud of Russian battlefields, but that wheeled and half-track transport could not. The problem became acute; for the tanks, although they could still advance, could not receive the full support of the Panzer Grenadiers. Yet in spite of all these difficulties, the German armor achieved outstanding successes during the advance into Russia.

The real debacle for the Germans occurred after STALINGRAD. No longer having the initiative, they were forced to withdraw rapidly to avoid destruction. They were unable to wait until the ground hardened sufficiently to permit passage for vehicles. Consequently the losses in half-track and wheeled transport were staggering. An analysis of opinions expressed by German officers from the grade of Lieutenant to Field Marshal indicates the widespread belief that full-tracked carriers for their armored infantry and logistical support units would have made their panzers far more effective. Even with the greater fuel requirements of the full-tracked vehicles, many senior German officers have expressed the opinion that these full-tracked vehicles might have enabled German armor to complete the destruction of the Russian armies in 1941.

TYPES OF CARRIERS

Wheeled Personnel Carriers

There are three types of armored personnel carriers, wheeled, half-track, and full-track. The U.S. Army does not possess a wheeled armored personnel carrier. That old standby, the 2½-ton 6×6 truck, was used extensively as a carrier for infantry and airborne divisions during World War II. However, the use of unarmored cargo trucks as personnel carriers is undesirable for the following reasons:

Poor Cross-Country Mobility. Any wheeled vehicle has less cross-country mobility than a tracked vehicle. Hence cargo trucks are unable to accompany tanks cross-country.

Lack of Armor Protection. The lack of armor protection makes both the truck and its passengers vulnerable to small arms fire. For this reason it cannot be used to transport infantry in the attack in the manner of an armored personnel carrier.

Other Transport Requirements. In the infantry and airborne divisions these cargo trucks are supply vehicles. If used to transport personnel, the vehicles are not employed on their primary mission and the logistical support of the division is impaired.

Armored Half-Track Carriers

The armored half-track was the most widely used personnel carrier employed by U.S. forces during World War II. The two outstanding versions were the half-track car M2 and half-track personnel carrier M3. The M2 is a half-track armored vehicle having a 147 HP WHITE 160 AX engine. The main armament of the M2 consists of two machine guns mounted on a gun rail, one caliber .50 and one caliber .30. The armor thicknesses vary but approximate one-fourth inch. It carries a crew of ten. The driver's seat, commander's seat, and one other are in the driver's compartment. There are three seats in each side of the personnel compartment and one at the head of the compartment. The M2 has no rear door.

The M3 has the same engine as the M2. It has seating arrangement for a crew of 13, a pedestal mount, and a rear door. The three front seats are like those of the M2. The other ten are arranged in two rows of five each, backed up against the fuel tanks and body compartment. There is no gun rail in the M3. The armament consists of one caliber .30 machine gun on a pedestal mount. Armor thicknesses are the same as the M2. (See Figures 1 and 2.)

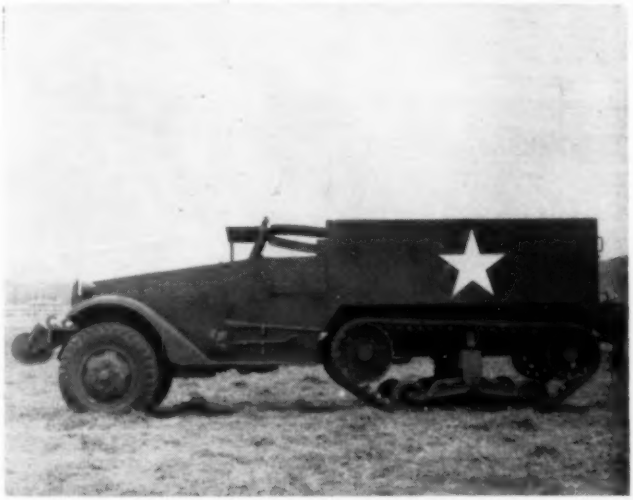

Figure 1. M2 Half-Track—Side View.

Both the M2 and M3 have a grade ability of 60 per cent and a cruising range of 200 miles. The fuel tanks have a capacity of 60 gallons. The maximum allowable speed of each vehicle is 45 miles per hour, and each vehicle can accelerate from a standstill to 20 mph in 10 seconds. However, their fording depth is only 32 inches.

As already pointed out, the biggest disadvantages of the half-track are its lack of overhead protection and its poor cross-country mobility. All active armored infantry and armored engineer units at present are equipped with the half-track. In all probability these vehicles will be used as

a substitute vehicle for the new full track carriers until a major mobilization occurs.

Figure 2. M3 Half-Track—Combat Loaded.

Full-Tracked Armored Personnel Carriers

There are two full-track armored personnel carriers standard in the U.S. Army today, the M39 and M44. The M39 (see Figure 3) is a full-tracked vehicle having a 485 HP Continental aircraft engine giving the vehicle a horse-power to ton ratio of 27 (horse-power to ton ratio of M26 tank is 10.8). It is the personnel carrier version of the fam-

ous M18 Tank Destroyer of World War II. This vehicle had the best cross-country performance characteristics of any U.S. armored vehicle employed in combat. The main armament of the M39 consists of a .50 caliber machine gun in a concentric mount over the personnel compartment. The armor thicknesses of the vehicle vary but are approximately one-half inch. It carries a driver, assistant driver, and eight men. The vehicle has a fording depth of 48 inches and a grade ability of 60 per cent. The fuel tanks hold 165 gallons, giving the vehicle a cruising radius of 150 miles. Its weight, combat loaded, is 36,000 pounds. The M39, however, has three outstanding deficiencies as a personnel carrier. First, there are no doors to the personnel compartment. To get in, personnel must climb on to the top of the vehicle and step down into the compartment. Second, it is too small. The light machine gun squad of the armored infantry rifle platoon contains 12 men, but the M39 has a capacity for only 10. Third, there is no overhead protection for the personnel. In spite of these disadvantages, the M39 is a far better training vehicle for armored infantry than the half-track since it has the necessary cross-country mobility to keep up with the tank units. The M39 is an authorized substitute for the M44.

The M44 armored utility vehicle (see Figures 4 and 5) is the T/O and E personnel carrier for armored infantry, armored engineer, and reconnaissance units. It has armor thicknesses of about one-fourth inch and mounts two machine guns; one caliber .50 on Ring Mount T 107 and one caliber .30 ball-mounted in the right sponson. It carries a driver, assistant driver, and 24 men. The vehicle has a fording depth of 40 inches and a grade ability of 60 per cent. Its fuel capacity of 225 gallons gives it a range of 180 miles. Combat loaded, it weighs 49,000 pounds. The engine is a 485 HP Continental providing a horse-power to ton ratio of 19.8.

The M44 is not a completely acceptable solution to an adequate and efficient armored personnel carrier. First, it is too big for a squad carrier; since 12 is the maximum required load, the vehicle is used only at 50 per cent capacity. Second, the fully enclosed (see Figure 6) personnel

Figure 3. M39 Armored Utility Vehicle.

Figure 4. M44—Front View—Showing Mounted Armored Infantry Rifle Squad.

compartment causes claustrophobia among some personnel when all hatches and doors are closed; sliding or folding top armor will be provided on successors to the M44 to remedy this. Thus, if overhead protection is not needed, personnel can open the top and not feel too confined. This feature has not yet been introduced into the M44. Third, the M44 has insufficient armor. To provide 100 per cent protection from small arms and medium artillery fragments at all ranges, the armor must be doubled. A new vehicle, the T-18 correcting all these defects, is under development. It will replace the M44 when standardized. The performance figures of the T-18 are classified for security reasons.

Figure 5. M44—Left Rear View—Showing Rear and Side Doors.

COMBAT CHARACTERISTICS

The outstanding capabilities added to any unit equipped with armored personnel carriers are cross-country mobility, light armored protection, and tremendous automatic weapons fire power.

Full-track personnel carriers can move over ground not always passable to half-track or wheeled vehicles. They enable armored infantry and armored engineer units to accompany tank units on the battlefield regardless of the speed at which the tanks advance. The personnel carrier in reconnaissance platoons provides the rifle squad the same mobility as the light tank section.

The armor of the full track, squad size, completely enclosed armored personnel carrier affords protection for the personnel against small arms fire and fragments. It does not provide protection against antitank weapons.

The automatic weapons mounted on the armored personnel carriers provide their units with tremendous automatic weapons fire power. These weapons can be fired effectively even though the enemy is striking the carrier with small arms fire and shell fragments. The carriers provide rapid and protected transportation for the crews, weapons, and ammunition to any point where it is desired to concentrate this fire.

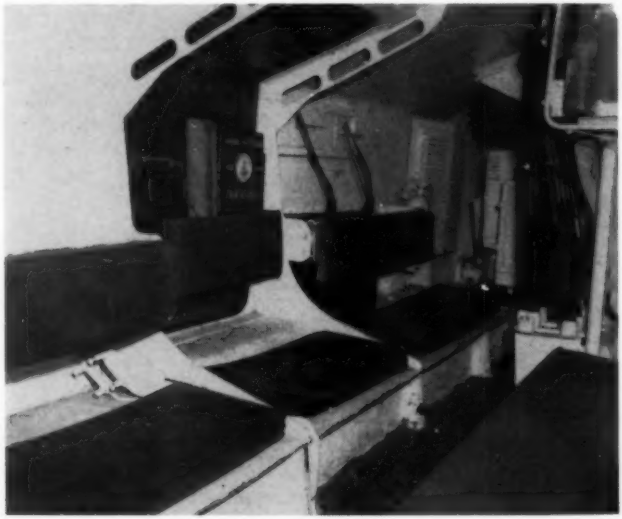

Figure 6. M44—Armored Utility Vehicle—Interior View of Personnel compartment (left front view).

These combat characteristics are all additive. In addition the unit equipped with the personnel carriers has all the other combat characteristics which it would have without the carriers. For example any infantry unit can be converted to armored infantry by being equipped with and trained in the employment of armored personnel carriers. Combat engineers can be converted to armored engineers by the addition of the carriers.

FACTORS AFFECTING THE EMPLOYMENT OF ARMORED PERSONNEL CARRIERS

Inherent Disadvantages

The carrier's weight and size increase the difficulty of its movement over favorable terrain. Bridges and soft ground must be reconnoitered to insure that they will support the carrier. It is frequently necessary to reinforce bridges and stretches of soft terrain. For river crossings and amphibious landings, it is mandatory to have boats or rafts capable of ferrying the carrier.

The *large silhouette* of the carrier makes it relatively easy to detect, especially when it is moving in the open or on the skyline.

The *noise of the carrier,* tracks, and power train warn an alert enemy. This noise can be heard often for several miles—especially at night. Drivers are trained to drive as quietly as possible when speed is not a paramount factor. By the use of artillery fires, carrier noise can be partially disguised, making it difficult for the enemy to determine the number of carriers or their exact direction of movement.

The armor restricts the crew's view when all hatches and doors are closed.

Other Factors

In the employment of tanks and armored personnel carriers, careful consideration of the terrain frequently makes the difference between success or failure. Some types of terrain favor the employment of tanks and carriers while other types restrict their use. Tanks and armored personnel carriers operate most effectively over rolling country

where their full cross-country mobility can be used. Swamps, unfordable streams, dense woods, heavily eroded terrain, steep slopes, and vegetation which limits visibilty are all factors which restrict tanks and carriers.

Weather is another factor which affects their use. Rain often renders otherwise good tank terrain so boggy that these armored vehicles are restricted to roads. Tanks and carriers can frequently move over ground covered by deep snow where other vehicles cannot. Ice makes roads and slopes slippery. Extreme heat and humidity reduce the efficiency of personnel in armored personnel carriers and cause excessive wear and engine heating. Even though adverse weather conditions make the successful employment of tanks and armored personnel carriers difficult, they may be used under these conditions to *secure surprise.*

Mines are easy for the enemy to lay and are always considered when planning an attack. Routes are carefully reconnoitered. The best avenues of approach are usually the ones most likely to be mined; therefore, consider attacking over less desirable terrain. Often a thorough reconnaissance and a reasonable amount of pioneer work makes a surprise attack over poor terrain both practicable and effective.

Armored personnel carriers consume large volumes of fuel and lubricants. The tonnage of these supplies, plus ammunition and fuel for attached tank units, requires cargo trucks to move as far forward as possible. In forward areas, ¼-ton trucks may be used to resupply individual tanks and carriers.

Carriers require adequate and continuous maintenance. Commanders allow sufficient time for their personnel to perform necessary maintenance.

TACTICAL EMPLOYMENT

The basic concept of the tactics of the armored division is based upon supporting the advance of tanks with armored (carrier-borne) infantry. The carrier enables the armored infantry to accompany the tank units on the battlefield.

These infantry units dismount and support the tanks when necessary or mop up and organize the objective. Adverse terrain or enemy antitank measures may force the armored infantry to dismount and continue the attack on foot supported by overhead or flanking fire from the tank element of the team. If no obstacles prevent or if the obstacles are breached in time, the tanks join the dismounted armored infantry for the assault. If adverse terrain conditions or enemy antitank measures require, the initial attack by the tank-armored infantry team is made with the armored infantry dismounted and supported by tank fire.

Armored engineers are a member of the fighting team in the armored division. The probability of the enemy using mines, demolitions, and other obstacles necessitates that armored engineers accompany the leading tank-armored infantry teams to assure passage of these obstacles. The armored personnel carrier provides the armored engineers the mobility and armor protection necessary to accompany these leading teams.

The employment of armored reconnaissance units is improved by armored personnel carriers. The light tank section and armored rifle squad normally are employed as a small tank-armored infantry team. In the attack, when terrain permits the cross-country operation of full tracked vehicles, the reconnaissance company commander may group his three light tank sections and three rifle squads into a reinforced platoon and employ this unit as a platoon size tank-armored infantry team. This employment makes a reinforced platoon of tanks and armored infantry available in the reconnaissance company of the infantry division. Such employment is not infrequent in the reconnaissance battalions of the armored division and the armored cavalry regiment (light).

The tactical advantage gained by a unit having armored personnel carriers is obtained by transporting the personnel in the carriers as far forward in each situation as terrain and enemy antitank defenses permit. The proper employment of armored personnel carriers reduces losses in crossing areas swept by small arms fire and fragments, conserves the energy of personnel for the assault, reduces the

time taken to close with the enemy, and utilizes the fire power of the vehicular weapons. It is borne in mind that the infantryman actually *fights* during the assault. As the rifleman advances toward the assault position, he is only positioning himself to fight. If infantry can be transported to the assault position in carriers, losses are greatly reduced; and the fighting efficiency of the individual is at the highest at the time he needs it, namely in the assault. The employment of armored personnel carriers in the presence of the enemy is predicated upon having sufficient friendly tanks in the formation to provide adequate protection against hostile armor. Conversely, the carrier enables infantrymen of the team to render close and continuous support to the tanks regardless of the speed of the tank advance.

UTILIZATION OF VEHICULAR FIREPOWER

The weapons mounted on the armored personnel carriers provide tremendous potential automatic weapons fire power to their units. These weapons may either be fired from the carriers, from ground mounts, or a combination of both. Emphasis is placed on firing these guns from the carriers. When vehicles are halted, the drivers may be employed to man one vehicular weapon on each carrier. If vehicular armament is placed on ground mounts, personnel must be taken from other duties to operate these weapons.

Carriers used for fire support are placed in hull (partial) defiladed firing positions. A carrier is in hull defilade when the lowest portion of the carrier visible from the front is the machine gun mounted on the top of the carrier. Use of hull defilade provides maximum protection while engaging enemy targets with direct fire.

When the vehicle commander desires to observe from the carrier without exposing it to enemy fire, he places it in *carrier (position) defilade*. Carrier defilade corresponds to turret defilade for a tank or any armored vehicle having a turret. Since the carrier has no turret, it is placed in carrier defilade. A carrier is in carrier defilade when the entire vehicle is behind cover, but the vehicle commander can still observe to the front from his hatch.

In the employment of vehicular weapons, the lack of assigned personnel for gun crews, the necessity of providing rifle protection for each dismounted gun crew, the necessity of leaving some weapons on the vehicle for local defense of the vehicles, and the large amounts of ammunition consumed by these weapons are factors to be considered in determining the number of guns to be employed in each situation.

However, these factors are approached by the commander as factors to be considered, not as limitations on his fire power. The maximum volume of fire power is used in each situation. The carrier weapons can be used to assist in placing a saturation volume of fire on the enemy's position during the attack and to inflict severe casualties on an enemy attacking on foot. In conjunction with the fires of the tanks and the volume of supporting fires available, the carrier weapons are a definite asset in the hands of commanders who understand the advantages to be gained from massed fire power.

CONCLUSIONS

The armored personnel carrier provides infantry and engineers with cross-country mobility comparable to a tank unit. This enables the tank-armored infantry-armored engineer-armored artillery team to advance at any rate of speed from that of the dismounted soldier to the full cross-country speed of tanks.

Morale on the March

The second sentence in Chapter I, proposed FM 21-18, Foot Marches, 1949, states in effect that "Infantrymen march on foot when transportation is not available."

To the infantryman this has obvious implications—he's in for some foot marching. Contrary to the well-advertised concept of push-button warfare, he still needs a pair of legs to carry him into, through, and out of battle. Thus the ability to march on foot, arriving at the destination fit to fight—or to pitch camp if that is the march objective—remains an important requirement of the infantry soldier.

The individual soldier, however, can exert little influence on the conduct of a march. The success of any march is influenced by his leaders, whose understanding of the factors which affect foot marching will determine his physical and mental condition before, during, and after the march.

Much has been written about the physical aspects of foot marching, less about the equally important mental factors which if unfavorable throughout the marching unit, cause discontent, dissension, reduce marching efficiency, and magnify any physical discomforts the soldiers may have. In other words, poor morale.

It is clearly within the power of leaders to create morale within their units, and most leaders strive tirelessly to this end. Yet strangely enough, in the conduct of a foot march many of these same leaders will do, permit, or cause to be done a number of irritatingly unnecessary things that create an unfavorable mental attitude in the minds of their men. This attitude will often be expressed verbally through the well-known medium of "griping," which again contrary to certain beliefs, is not always healthy.

Let's list the solution to some of the more constructive gripes:

1. Don't have your men fall-in too far in advance of the actual starting time; form your unit just before the start of the march.

2. Avoid delays in which the men remain standing. Such delays increase fatigue by restricting their movement and preventing them from easing the weight of their equipment. Long delays cause them to cool off and stiffen, making it more difficult for them to resume the march.

3. Do not permit motor vehicles to speed by your column covering the men with dust or mud; make vehicles slow down to a safe and considerate rate. To control traffic, place guards at the head and rear of your marching columns. Let vehicles pass only when it is safe to do so.

4. Prevent straggling because it lowers morale very quickly and reduces the unit's strength and ability to perform its mission at the end of the march. Straggling is infectious, for after one man falls out, the others feel less compelled to continue the march. Watch for conditions which cause march casualties and make frequent inspections to check the physical condition of your men. Platoon leaders should march at the rear of their platoons to observe the men and prevent straggling.

5. Maintain an even pace; nothing is more tiresome than a ragged, uneven pace that is slow one minute, fast the next. Appoint a noncommissioned officer as pace setter and check frequently to see that he keeps a uniform cadence.

6. Except for specific training purposes, do not march your men over difficult routes when either shorter or easier routes are available. Make a route reconnaissance to get information of conditions which might cause delays. By prompt decision and action on the march, reduce any delays which could not be foreseen before the march.

7. Determine beforehand if there is a medically approved water supply along the route. If not, carry a plentiful resupply in the unit transportation. On long marches during hot and humid weather men may need as much as three gallons each per day for drinking and cooking.

8. See that your men carry only essential equipment and wear comfortable uniforms appropriate to the weather and the conditions of the march. Have the unit transportation carry the cargo packs (rolls), combat equipment and supplies. Let each man carry his weapon and load in the position most comfortable to him as long as it does not cause discomfort or danger to others around him.

9. Before starting out, explain the where, why and how of the march to your men. They don't like to be kept in the dark about these things. Don't minimize or exaggerate any expected difficulties.

10. Encourage any diversion which takes the soldier's mind from the routine of the march. Such things as counting cadence for short periods, singing, conversation, or humor in almost any form help to pass the time and divert attention from less pleasant aspects of the march.

The ten items listed above (and many others) will invariably be within the power of leaders to control in a manner that is favorable to the troops. A foot march may be necessarily tough and difficult, and the men will take pride in their ability to take it. It is the *unnecessary* irritations, restrictions, and lack of foresight that destroy morale.

Antitank Defense

Compiled by Lt. Col. Russel O. Harris, Infantry

The purpose of a coordinated antitank defense is twofold: to protect an area of command against armored attack, and to deny an attacking force the support of its armored mobile weapons. This is accomplished by the destruction of enemy armor with fire and by using natural and artificial obstacles to canalize enemy armor into routes or areas where it cannot effectively support other ground action.

The antitank defense plans for forward areas are formulated by infantry battalion commanders and the battalion antitank plans are coordinated into regimental antitank plans. Each battalion commander develops his antitank plan based on his own observations and the recommendations of his leaders. A battalion commander may designate an officer to assist him by collecting reports and recommendations and coordinating them into a battalion plan for approval.

The infantry battalion commander has at his disposal many weapons and other defensive means which are capable of contributing to the antitank defense of the battalion area. The terrain provides some antitank obstacles; others are established by construction, demolition, or by mine fields. Some of the available weapons can penetrate armor; others have very little if any armor-penetrating ability. All weapons, however, contribute to the effectiveness of the antitank defense.

The principles of defensive combat apply to antitank defense to the same extent as do the other defensive measures. The application of the principles of defensive combat is influenced by many factors. Those which have particular influence on antitank plans are: the type, location, extent

and effectiveness of tank obstacles; the availability of antitank mines; availability of antitank weapons and suitable positions for the weapons; the location of objectives for enemy armor; and routes of approach within and forward of the battle position.

The most effective antitank defense is to destroy hostile armor by fire. Antitank mine fields and other types of obstacles are used to increase the defensive strength of the terrain, and thus facilitate the destruction of hostile armor by antitank fires.

Both natural and artificial obstacles play an important role in antitank defense. The location of a defensive position is often determined by the location of obstacles. Natural tank obstacles include water courses, lakes, swamps, heavy woods, stumps, and large boulders or deep erosion ditches. Natural obstacles may be supplemented by artificial tank obstacles such as dragon's teeth, antitank ditches, and tank traps. However, artificial obstacles of this type are usually beyond the constructional capabilities of a front-line battalion. Antitank mine fields can be quickly laid by infantry units and are particularly effective artificial obstacles. In addition to causing mechanical damage, they have a considerable psychological effect on the tank crews.

The effectivenes of antitank obstacles is measured by the degree of the difficulties imposed on hostile attacking armor. Streams usually require the construction of bridges or fords. Swamps must be by-passed or crossed with caution at slow speeds under the constant danger of becoming mired. Heavy woods restrict the vision of crews and may prevent traverse of the tank cannon. Numerous large boulders and heavy stumps are difficult to avoid and may cause mechanical damage sufficient to immobilize the tanks.

Antitank mine fields connect or extend existing obstacles. Tanks attempting to by-pass the mine fields are canalized into the fields of fire of antitank weapons. Antitank mines are also used to block dangerous approaches in such a manner as to hold or delay hostile armor sufficiently to permit their destruction by the fires of antitank weapons.

The first factor in selecting the location of antitank mine fields is the accurate evaluation of the tank obstacles and approaches. A general evaluation of the terrain made by the regimental commander serves as a basis for the allocation of mines and weapons. Some of the factors considered in the evaluation of terrain are:

a. The location, nature, effectiveness, and extent of existing obstacles.

b. Areas which provide the best fields of fire for antitank weapons.

c. Positions for antitank weapons and routes to the positions.

d. The location of attack positions for hostile armor.

e. Routes to hostile attack positions and the location of these routes in relation to the routes of tank approach into the battle position.

f. Areas forward of the battle position which permit the greatest maneuverability of hostile armor.

g. The road net and usable tank routes within the battle position.

h. The location of and routes to hostile armor objectives.

Mine fields are then located where they will most delay hostile armor and most strengthen the antitank defense of the area.

Evaluation of the terrain may indicate that mines should be used to reduce the number of approaches by connecting two obstacles, thus permitting a greater concentration of antitank fires on the remaining approaches. (See Figure 1.)

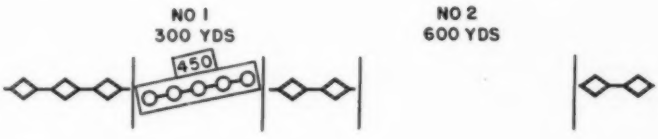

Figure 1. Where the number of mines is limited, and the approaches have the same characteristics except width, the approach mined is that one which can best be blocked by available mines.

If the number of mines available is insufficient to connect obstacles, mine fields may be used to extend one of the obstacles across the portion of the approach containing the most restricted fields of fire. Enemy tanks attempting to use this covered portion of the approach are met with the combined effectiveness of antitank mines and antitank fires. If tanks by-pass the mine field and use the open portion of the approach they are met by concentrated antitank fires delivered under the most favorable conditions. (See Figure 2.)

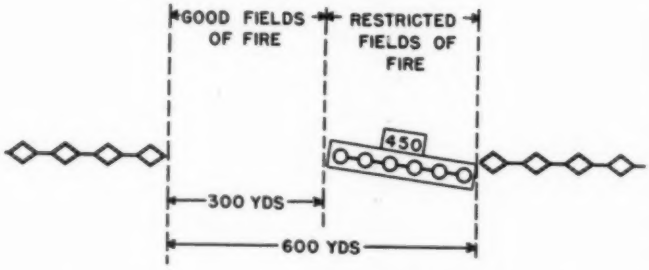

Figure 2. Where available mines do not permit mining an entire tank approach, that portion having the more restricted fields of fire is mined, if all other characteristics of the approach are equal.

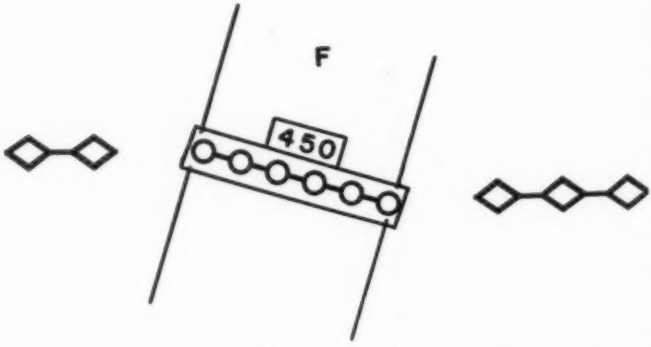

Figure 3. Since the center portion of the approach (F) will permit hostile tanks to maneuver at top speed, a mine field in that portion will reduce their speed of advance and gain time to engage them with AT fires.

It is not always possible to use mines to extend other obstacles. The terrain may dictate that a mine field be located in a high speed tank approach since mine fields reduce the speed of approach and thus provide better targets for the antitank weapons. (See Figure 3.)

Unless defended by fire most tank obstacles can be quickly overcome. Mine fields can be breached and cleared, streams forded or bridged, and other obstacles by-passed. Employed to restrict the maneuverability of hostile vehicles and to canalize them into areas where they can be more readily destroyed by antitank weapons, obstacles are most effective when defended by both antitank and small-arms fire.

ANTITANK WEAPONS

Many weapons effective against armored vehicles are available for defensive combat. They vary in size and effectiveness from the antitank rifle grenade to heavy aerial bombs and rockets. In his antitank plans an infantry battalion commander considers only those weapons available to him. Normally these weapons are tanks attached from regiment and the weapons organic to an infantry battalion: 75-mm rifles, 2.36-inch and 3.5-inch rocket launchers, antitank rifle grenades, and 57-mm rifles.

Of these antitank weapons the tank is the most effective. The fire power of the tank cannon, the armor protection for the weapons and crew, and the mobility and flexibility of employment all contribute to the effectiveness of this weapon.

In most defensive situations the regimental commander attaches one or more tank platoons to the front-line battalions, the remaining platoons of the regimental tank company being attached to the reserve battalion. If an additional tank company is attached to the regiment it may be attached to the reserve battalion and all platoons of the regimental tank company attached to the front-line battalions.

The use of tanks by a front-line battalion is essentially the same regardless of the number of platoons attached.

Additional tanks provide a more complete coverage of all tank approaches and concentrate a greater volume of antitank fire on the more dangerous approaches. Tanks are distributed laterally and in depth throughout the battalion area to extend the depth of the antitank defense. The exact pattern of distribution and the individual tank firing positions are determined by the location of tank approaches into the area and the location of positions from which these approaches can be covered. Hull defilade firing positions provide the greatest amount of protection with the least time and labor and permit the tanks to move to supplementary or alternate positions with the minimum exposure. When possible, tanks are so located that two or more can cover the same approach from different directions. (See Figures 4 and 5.)

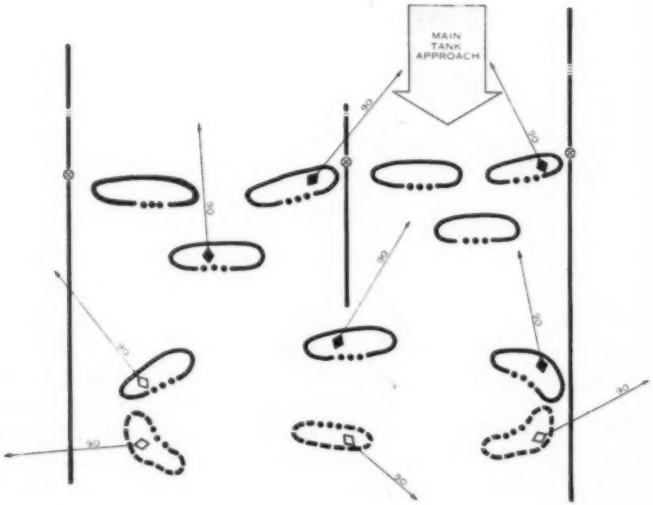

Figure 4. One tank platoon in antitank defense of an infantry battalion area.

When availability of tanks for front-line defense is limited and when timely warning of the approach of enemy armor is assured these tanks may be held mobile with prepared positions into which they move to meet the armored threat.

The 75-mm rifle is the most effective antitank weapon organic to the infantry battalion; however, it will penetrate only 4½ inches of armor. In defensive situations each of the two 75-mm rifle sections can operate two weapons, making a total of four available to a battalion.

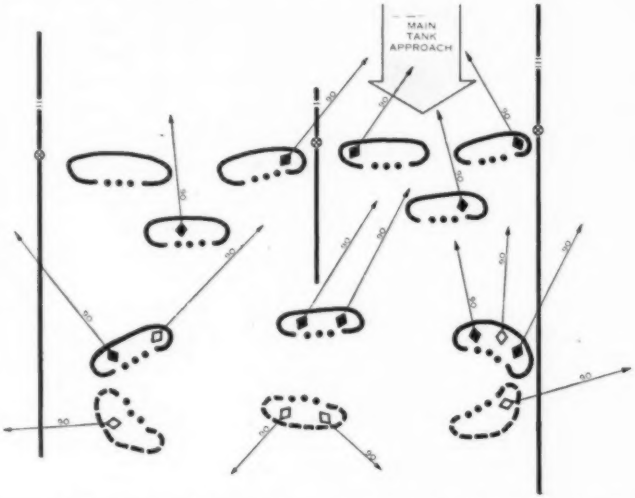

Figure 5. Two-tank platoons in antitank defense of an infantry battalion area.

The 75-mm rifles are sited to cover tank approaches into the battalion area. In front-line battalions they are located so they can engage hostile tanks before they reach the main line of resistance, usually from positions in the forward platoons. When friendly tanks also are in the battalion defense area, the 75-mm rifles supplement the tank fires. (See Figure 6.) The two 75-mm rifles of a section are separated to prevent a hostile tank from engaging more than one at a time, but are sited so that they are mutually supporting.

If necessary, however, each of the two rifles of a section is sited to cover a separate approach. Since tank armor is not as thick on the sides as on the front, 75-mm rifles are sited to deliver flanking fire whenever possible.

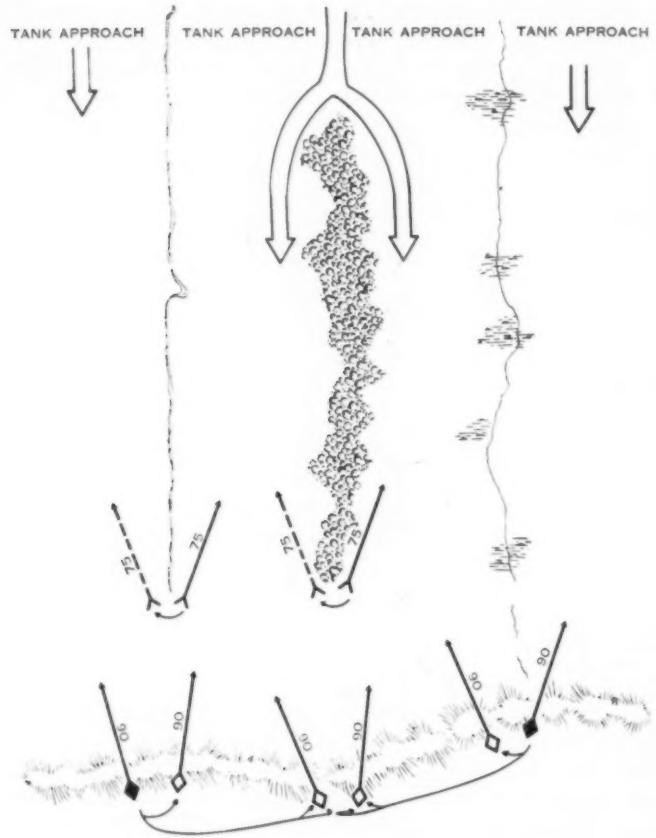

Figure 6. Each approach is covered initially by an antitank weapon. Flexibility permits concentration of antitank fires on any particular approach.

Rocket launchers and antitank grenades provide close-in antitank protection for platoon areas and weapons crews. The positions and fires of these weapons are closely coordinated with other antitank weapons to provide the most nearly complete and effective antitank coverage possible.

The 57-mm rifle is not primarily an antitank weapon but it can effectively engage armored vehicles and its antitank capabilities are considered when locating antitank weapons. One 57-mm rifle is usually located in each infantry platoon area.

Other weapons contribute to the antitank defense. Small arms, particularly rifles and machine guns, defend mine fields and other obstacles. Mortar and artillery fires separate attacking infantry from its tanks making it more difficult for the foot troops to fire on antitank weapons or to breach obstacles. Artillery concentrations damage tank periscopes and radio antennas and make control more difficult. Fires of 155-mm and larger caliber can destroy or disable tanks. Concentrations of artillery and heavy mortars also have considerable psychological effect on tank crews causing them to break up attack formations and seek more concealed and less desirable routes, thus slowing their attack.

Smoke blinds tank crews when wind and weather conditions are favorable to the defender.

COORDINATION OF ANTITANK DEFENSE

Coordination of the antitank defense with other defensive measures not only strengthens the antitank defense but adds to the effectiveness of these other measures as well.

The location of natural obstacles and existing artificial obstacles is usually fixed and adjustments in the relative location of obstacles and the defensive position is made by higher commanders when locating the defensive position. Adjustment of the main line of resistance by smaller units is limited to the general trace established by higher commanders. Minor adjustments may be made, however, to cover obstacles by fire more effectively. Existing obstacles are evaluated and selected tank obstacles improved, extended, connected, or otherwise supplemented by mine fields, or other forms of artificial tank obstacles. This process of

supplementation is continued as time, materials, and the situation permit until numerous tank barriers are formed in depth. A barrier system is also established within the battle position but first priority is given to installations and works immediately forward of the main line of resistance. Barriers are planned and constructed to block lateral movement of the enemy's tanks as well as movement parallel to the axis of his attack.

Tank obstacles are not a substitute for antitank fires. All possible tank approaches are covered by antitank fires regardless of obstacles which may block them. Usually fewer, or less effective weapons can, however, adequately cover a tank approach when the antitank fires of weapons are coordinated with the obstacles to combine the effectiveness of both.

The commander evaluates the obstacles in each area to determine the number and type of antitank weapons required to provide adequate antitank coverage. The availability of weapons and position areas for these weapons determines how closely the requirement can be met. The terrain may require that several weapons of various types be used to gain complete coverage of one approach. For example, a tank in a hull defilade position may be unable to observe or fire on some portions of a tank approach, particularly the close-in portion. A 75-mm rifle is used to cover all or part of the area not covered by the tank and rocket launchers and antitank rifle grenades cover close-in areas which cannot be covered by other antitank weapons.

Rifles, automatic weapons, artillery, and mortars engage foot elements accompanying tanks leaving the antitank weapons free to deal with the hostile armored elements. Obstacles to foot elements such as barbed wire entanglements also assist in separating foot and tank elements.

CONDUCT OF ANTITANK DEFENSE

The hostile force is engaged as early as possible to inflict casualties and delay his advance. It may be engaged initially by aircraft using either bombs or rockets. Rockets are particularly effective against armored elements. As the enemy comes within range of ground weapons he is

engaged by long range artillery fires. Antitank weapons engage his armored elements as soon as they present profitable targets. All weapons located with the forward security elements reinforce the fires of artillery and tanks as soon as the enemy comes within effective range. Mortars and machine guns intensify the fires delivered against the attacking foot elements; 75-mm rifles or other antitank weapons add to the antitank fires delivered by the tanks.

If forward security elements have not been established or have been withdrawn long-range fires are delivered by the artillery, mortars, and tanks. Weapons other than tanks located near the main line of resistance do not open fire until the enemy is within effective rifle range of the main line of resistance. Although some weapons located near the main line of resistance may be able to engage the enemy at a greater range, their fires would prematurely disclose the pattern of the defensive position. Withholding the fires of these longer range weapons until riflemen open fire permits the delivery of intense surprise fire on the enemy when he is less able to react promptly and change his scheme of maneuver. As soon as the location of the main line of resistance is disclosed by the fire of small arms, antitank weapons located in forward areas engage hostile tanks within effective range.

When the terrain permits, tanks may also deliver highly effective surprise fire. One tank may engage hostile tanks to draw them into a favorable area while other tanks withhold fire and remain concealed. When the hostile tanks have reached the predetermined area or attempt to by-pass the firing tank, the concealed tanks open fire from the flanks. The 75-mm rifles may also participate in this type of surprise fire.

As enemy armor closes with the battle position, 57-mm rifles, rocket launchers, antitank grenades, and other weapons add to the intensity of these antitank fires.

If some hostile tanks succeed in penetrating the battle position they are engaged by antitank weapons located in depth until the momentum of the attack is spent and the attacking tanks can be destroyed by a counterattacking force.

WIDE FRONTAGE

A front-line battalion may defend a frontage of 1,200 to 5,000 yards. When the frontage exceeds 2,400 yards mutual support becomes more difficult and flexibility assumes added importance. In the defense of a wide front key terrain features are organized in strength and the rest of the main line of resistance is held relatively lightly. Any sacrifice of mutual support is made between key terrain features, not between the elements on a key feature.

The antitank defense of a wide front conforms to the troops' disposition but the increased width of the sector defended by each unit usually includes a proportionately greater number of tank approaches. This increase will often require that at least some of the approaches be covered initially by only one long-range antitank weapon. Such a condition requires greater flexibility in the use of antitank weapons. To take advantage of their inherent mobility, many supplementary positions are prepared for tanks. Detailed plans are made for movement to each position so tank fires can be concentrated in any tank approach. The careful and extensive use of antitank mine fields materially assists in maintaining flexibility and greatly increases the effectiveness of the tanks and other antitank weapons.

The 75-mm rifles are employed in essentially the same manner as for a normal frontage. The proportionately greater number of tank approaches may require that all 75-mm rifles be used as individual weapons rather than by sections. Some of the disadvantages of dispersion and individual employment can be overcome by preparing several supplementary positions from which one rifle can support the rifle covering an adjacent approach. This lack of mutual support can also be overcome to some extent by using 75-mm rifles to cover approaches which can also be covered from supplementary tank positions. The 75-mm rifle is then in a position to engage and delay the hostile armor until the fires of one or more tanks can be shifted to that approach. (See Figure 6.)

RIVER LINE

A river line may be defended by an offensive type defense or a position defense. In an offensive defense outguards are posted along the river line and the larger portion of the troop strength is withheld as a counterattacking force. In this type of defense the enemy is counterattacked while crossing the river. The use of tanks in this and other types of mobile defense is essentially the same as in offensive operations.

A position defense may be organized on the river bank or in rear of the river line. The defensive strength of a river permits the organization of a position defense of a river line on frontages in excess of the normal maximum. The disposition of troops and organization of the ground conforms to the principles of defense. The river adds considerable defensive strength to the position and greatly influences defensive plans, particularly antitank defense plans. Because all tank approaches either end at the river or are interrupted by the river, enemy tank approaches have less value as assault routes. Steep river banks or the lack of usable routes on the defended side of the river further decrease the value of tank approaches. Because hostile tanks and other direct fire weapons may support the crossing from their side of the river, the defender's antitank weapons are located in the forward areas where they can engage hostile supporting tanks. Some of these forward positions may be occupied initially or the tanks may be held in assembly areas until the location of the attempted crossing is known. The decision to occupy firing positions or to remain in assembly areas will depend on the width of the front, condition of the terrain in the position, position areas available, location of crossing sites, and the number and location of firing areas available to enemy tanks. Tanks occupying firing positions engage personnel, boats, equipment, bridging operations, or other targets when not engaged with hostile supporting tanks.

To provide depth to the antitank defense, tank positions are selected and prepared along tank approaches which the enemy is capable of using regardless of where the enemy

bridgehead is established. From these positions in depth tanks can participate in counterattacks to clear the enemy from the near bank of the river.

The 75-mm rifles are employed from positions covering the river and the far bank. They are sited to cover crossing sites and position areas of enemy direct-fire weapons supporting the crossing. Because of the extended front and the condition of most terrain along a river it is usually necessary to employ the 75-mm rifles individually instead of by section. In addition to their normal antitank role 75-mm rifles fire on assault boats, launching and landing operations, bridging operations, or other profitable targets.

The use of the 75-mm rifles varies with the type of defense. If the position defense is some distance from the river their use is little different than in other situations. In the offensive-defensive type of river line defense, 75-mm rifles with the counterattacking force are used generally the same as in a limited objective attack.

BUILT-UP AREAS

It is usually desirable to defend cities or towns from positions well forward of the built-up areas. Defensive positions are organized to block approaches and to deny access to the built-up areas of the town. The battle position is organized the same as for the defense of other key terrain or areas. The defense may take a form similar to that of a river line defense, a defense on a wide front, or a defense on a normal front. When practicable the defensive position is located to prevent the hostile force from placing light artillery fires on the built-up areas. The situation may require, however, that the defensive position be organized within the built-up area. Such a position is organized according to the same principles which apply to the organization of any defensive area. Conditions peculiar to built-up areas, however, present many difficulties in the application of these principles.

Built-up areas present numerous obstacles separated by narrow approaches and a defensive position within the built-up area is, in effect, a defense of selected obstacles. Both

the defender and the attacker are influenced by the following characteristics of a built-up area: observation and fields of fire are reduced, cover and concealment are increased, the effectiveness of weapons is reduced, communication is impeded, and mobility is restricted for vehicles and foot elements.

The main line of resistance may be located on or near the forward edge of the built-up area to obtain better observation and fields of fire and to deny the enemy cover and concealment afforded by the buildings; or, it may be located well within the built-up areas to conceal its location or to take advantage of obstacles such as rivers, railway embankments, or similar barriers.

The defenders organize key terrain within the area: hills within the town, buildings, street intersections, parks, cemeteries, or other positions which provide good fields of fire.

The movement of hostile armor is usually limited to streets. However, the number of streets leading into a position may require that most or all approaches be covered by only one antitank weapon. Restricted observation and fields of fire limit mutual support between antitank weapons. Tanks may not be able to occupy supplementary positions in the forward areas to effect mutual support. All approaches are mined, cratered, blocked by debris or other obstacles, and tanks occupy positions which provide good fields of fire covering approaches not adequately covered by other antitank weapons. To off-set the lack of mutual support and loss of flexibility of antitank weapons in support of the main line of resistance, every effort is made to extend the antitank defense in depth. Since routes within the battle position may be suddenly blocked by collapsing walls or over-passes tank crews must be familiar with all possible routes within the position.

The defender can compartment the built-up area by demolishing buildings or by using rubble to form a grid of antitank barriers. Such a grid seals off or limits any single enemy penetration to a small area. This principle applied to the entire organized area produces the most effective defense in depth.

A defensive position within a built-up area presents the same restrictions on 75-mm rifles as on tanks and other direct-fire weapons. The back blast of the 75-mm rifle imposes an additional problem; care must be exercised in locating these weapons in buildings, because when fired from an enclosed space the back blast endangers the crew.

The 75-mm rifles are usually used individually and sited generally the same as tanks except greater effort is made to place them where they can deliver fire against the sides of the tank.

Rocket launchers and antitank rifle grenades are more valuable as antitank weapons in a built-up area because fields of fire are usually short and within the effective range. Buildings and fallen masonry provide excellent positions from which these weapons, particularly the rocket launchers, can exploit their armor penetrating ability.

SUMMARY

The employment of all measures effective against tanks is planned and coordinated in order that the weaknesses of attacking armor can be exploited to the maximum.

The fires of antitank weapons are the most effective means of antitank defense. Tank obstacles are employed to canalize hostile tanks into areas, and delay them in those areas in which they can be most readily destroyed by antitank fires. Weapons are sited to deliver these fires from positions which provide the most protection for the weapons and crews, consistent with the terrain and situation. Thus the defender EXPLOITS THE WEAKNESSES OF ATTACKING ARMOR AND THE STRENGTH OF HIS ANTITANK DEFENSE.

Small Arms Instructional Aids

Compiled By
Captain Frederick H. Black, Infantry

"What training aids does The Infantry School use in teaching small arms functioning and marksmanship?" That question appears again and again in correspondence from officers and noncommissioned officers assigned to National Guard, ROTC, and regular units. It is usually followed by another, a hopeful, query, "Can training aids be procured from The Infantry School?"

The School has had to answer regretfully, "No we cannot supply you with training aids. Ours come from the same sources that are available to you: training films and film strips from Signal Corps film libraries; the excellent Graphic Training Aids series through the Adjutant General's Department; a few from other sources; but in great part we make our own."

With anything but facetious intent the School advises other weapons instructors to do the same—make their own, except, of course, for those aids which can be obtained through normal channels.

The Infantry School uses training aids which range from the simplest charts, whose manufacture is within the capabilities of nearly everyone, up to complicated wooden working models of the working parts of the weapons.

In a later issue the QUARTERLY plans to present detailed constructional information and drawings for those units desiring to construct the more elaborate working models. This short article, however, is concerned with the simpler aids, mainly charts which, despite their comparative ease of construction, have been found highly valuable in teaching weapons functioning and marksmanship.

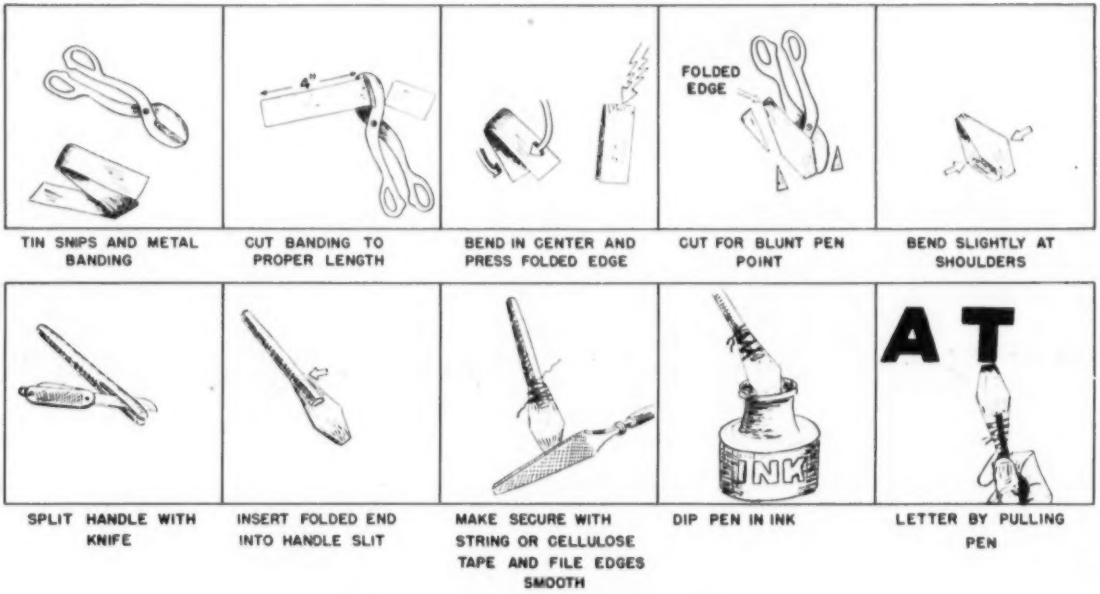
TIN SNIPS AND METAL BANDING
4"
CUT BANDING TO PROPER LENGTH
BEND IN CENTER AND PRESS FOLDED EDGE
FOLDED EDGE
CUT FOR BLUNT PEN POINT
BEND SLIGHTLY AT SHOULDERS
SPLIT HANDLE WITH KNIFE
INSERT FOLDED END INTO HANDLE SLIT
MAKE SECURE WITH STRING OR CELLULOSE TAPE AND FILE EDGES SMOOTH
INK
DIP PEN IN INK
AT
LETTER BY PULLING PEN

Figure 1. Construction of drawing pen.

For classes where chart boards are unavailable the School has found that charts are most useful when painted directly on 4 by 6 foot plywood panels. Lettering 2½ inches high can be seen readily from a distance of 75 feet. These wooden charts are particularly useful out of doors and can be used indoors as well.

Where charts receive less than the almost continuous use to which they are subjected at The Infantry School, those painted or drawn on paper will be just as satisfactory as well as much less expensive and easier to make. They may be improvised on common wrapping paper with ink, paint, or crayon. Those shown in this article also can be projected with a machine such as the belopticon.

Excellent work can be produced with wrapping paper and various widths of Stoakes pens plus a supply of colored inks. In case pens are not available through local book stores, even they can be constructed quickly and inexpensively. (See Figure 1.) Materials consist of the metal banding used to secure crates and boxes, small dowel rods of about the same general dimensions as an ordinary penholder, and short lengths of string or cellulose tape.

Simple working models of such parts as the rear sight windage gauge on the M1 Rifle are easily constructed by anyone with even elementary carpentry ability.

In general, a scale of ten to one will enlarge drawings or models to a size sufficient to be seen readily at a distance of 75 feet.

The remainder of this article discusses briefly some of the simpler training aids used with the various weapons and their application to the subject for which they were designed. Units which have projection machines can project the drawings shown directly from the pages on which they are printed. No dimensions are indicated since those who wish to make the charts or construct the simple models can use any scale which they find applicable to their situation.

M1 RIFLE

1. WORKING MODELS. *a. Model sight picture device.* (See Figure 2.) With this adjustable model the instructor can illustrate for the student what he means when he refers

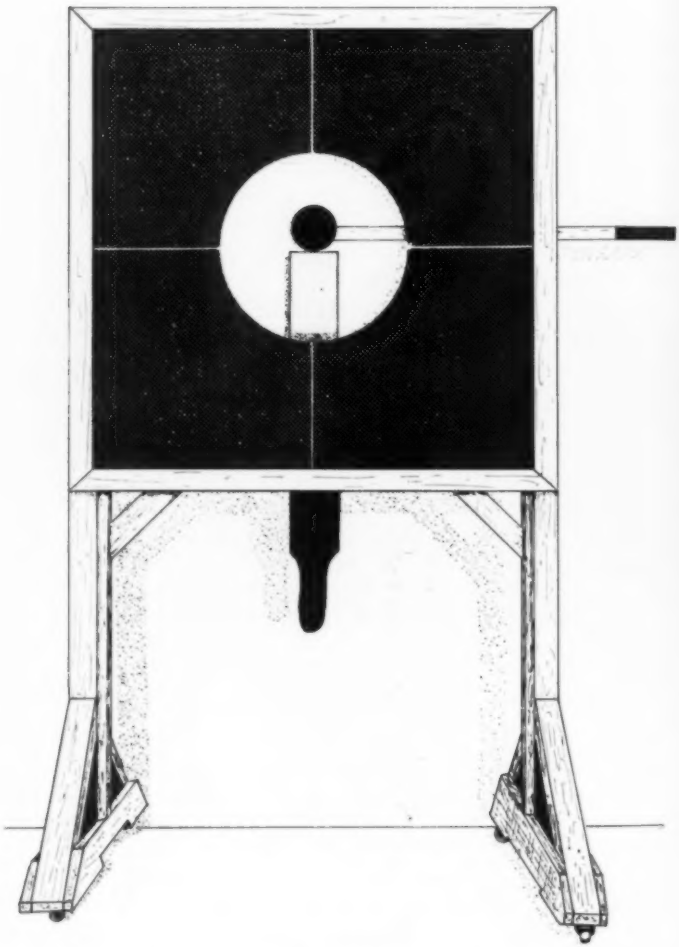

Figure 2. Model sight picture device.

to "correct sight alinement" and "correct sight picture." The model is so constructed that incorrect sight alinements and pictures may be shown as well as those which are correct. This feature enables students as well as instructors to explain and demonstrate the necessary corrections. Use this model early in the course, then as needed throughout the course to correct faulty sight pictures.

b. Rear sight windage gauge model. (See Figure 3.) This large scale wooden working model is used during the conference on sight changes and wind effect. Illustrative problems involving changes in windage on the rear sight are set up and discussed on this model.

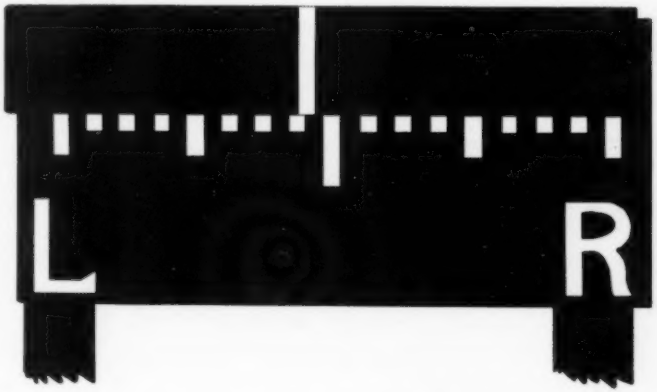

Figure 3. Rear sight windage gauge model, M1 Rifle.

2. CHARTS. *a. Sustained fire.* (See Figure 4.) During periods of instruction covering sustained fire exercises, much emphasis is given to the time allowed for each shot of the nine shot string as well as the time allotted for reloading. With an introductory conference in which a chart of this type is used, followed by practical work in sustained fire exercises during preparatory marksmanship, students encounter less difficulty in sustained fire timing.

b. Layout for examination. (See Figure 5.) This chart, depicting a schematic layout for an examination prior to

range firing, shows prospective instructors the layout and method for handling an examination on the M1 Rifle. A similar chart may be used for the other weapons.

c. Scorebook page. A very much enlarged page of the scorebook is painted in white on a plywood board painted a flat black. With this blackboard surface the instructor chalks pertinent information in the score page blanks. Since erasures are possible this single training aid permits the presentation of numberless problems in scorebook use.

3. MISCELLANEOUS TRAINING AIDS. *a. Targets.* While a firer is given considerable instruction regarding the sights of his rifle and how to manipulate them, this information is of little value if the man doesn't know the dimensions of his targets. The Infantry School solution to this problem is elementary yet effective—the various targets used on the known distance range are simply marked with their demensions and shown to the class prior to going on the range.

M-1 RIFLE
SUSTAINED FIRE CADENCE

SHOT	1ST	2D	3D	4TH	5TH	6TH	7TH	8TH	9TH	TOTAL TIME
SECONDS	10	20	24	28	32	36	40	44	48	50

Figure 4. Sustained fire time chart.

BROWNING AUTOMATIC RIFLE

1. CHARTS. *a. Trigger group.* (See Figure 6.) This chart quite vividly portrays a cutaway version of the assembled trigger group. It is used from the speaker's stand during mechanical training in pointing out parts under discussion and their position relative to other parts. It is a fairly effective substitute for a wooden working model.

Figure 5. Layout for examination chart.

*This is the chart now in use at The Infantry School. When the new marksmanship course described in this issue of the QUARTERLY goes into effect the "sitting position," number 5 on the chart, will be eliminated.

b. Buffer and rate reducing group. (See Figure 7.) A cutaway picture of another group of the automatic rifle. It is used in the same manner as the trigger group chart.

c. Immediate action. (See Figure 8.) Since stoppages will occur with any automatic weapon, instruction in the application of immediate action is mandatory. A chart as simple as the one shown assists materially in such instruction which is accompanied or followed by practical exercises

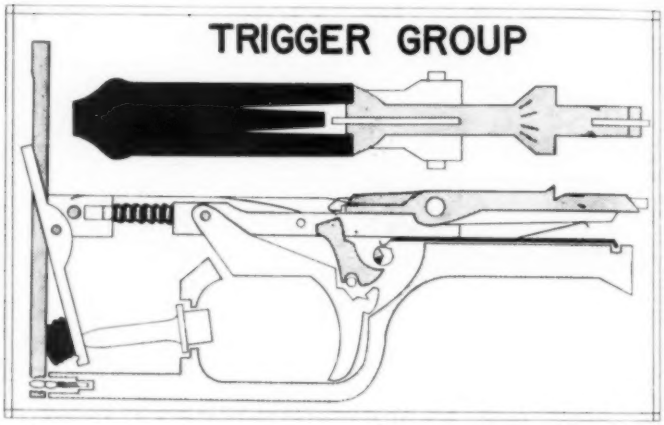

Figure 6. Trigger group chart, BAR.

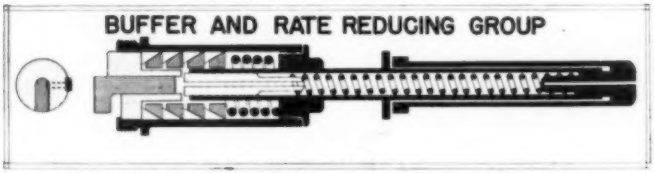

Figure 7. Buffer and rate reducing group chart, BAR.

on the two phases of immediate action. The instructor uses the weapon itself as a training aid.

d. Second phase stoppage pictures. (See Figure 9.) The application of immediate action is of little value when the firer fails to understand the cause of his stoppage. This chart shows pictures of six of the most common stoppages that a firer will discover upon application of the second stage of immediate action. These causes range from a defective magazine in picture 1 to a live round which has failed to fire in picture 6. Stoppages may be illustrated on the weapon itself should a chart be unavailable.

e. Feeding. (See Figure 10.) The second step in the forward movement of the operating parts of the automatic rifle is pictured in this simple chart which shows those parts of the weapon which are involved in feeding.

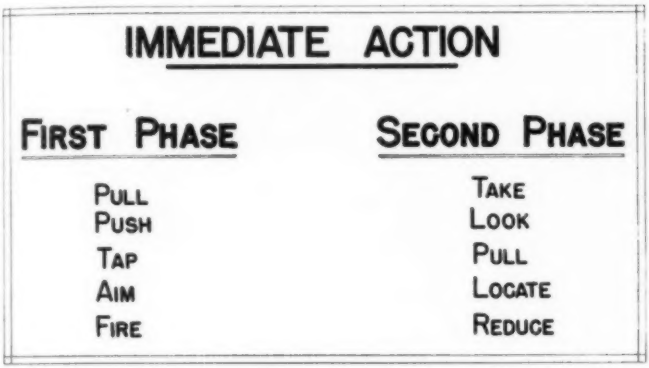

Figure 8. Immediate action chart, BAR.

f. Gas system. (See Figure 11.) This chart simplifies the usual intricate discussion of the course taken by the gases formed by ignition of the powder charge. The student sees an accurate picture of the path taken by the gases as they progress from the barrel through the four ports into the gas cylinder-well where they drive the operating parts to the rear.

g. Rear sight. (See Figure 12.) In this chart, the rear sight, normally discussed during preparatory marksmanship, is clarified in a greatly enlarged drawing. Its use simplifies discussion and the answering of questions.

*h. Clock system.** (See Figure 13.) This chart, showing the firer placed in the center of a large clock with the target at twelve o'clock, aids the instructor in illustrating the clock system, wind rule, and the windage and elevation rule.

2. MISCELLANEOUS TRAINING AIDS. *Shot groups.* This training aid assists in familiarizing the student with one of the shot groups which he will encounter upon committing an error in firing. This aid is nothing more than a

*The "D" target shown at "twelve o'clock" will be replaced when the new marksmanship course goes into effect.

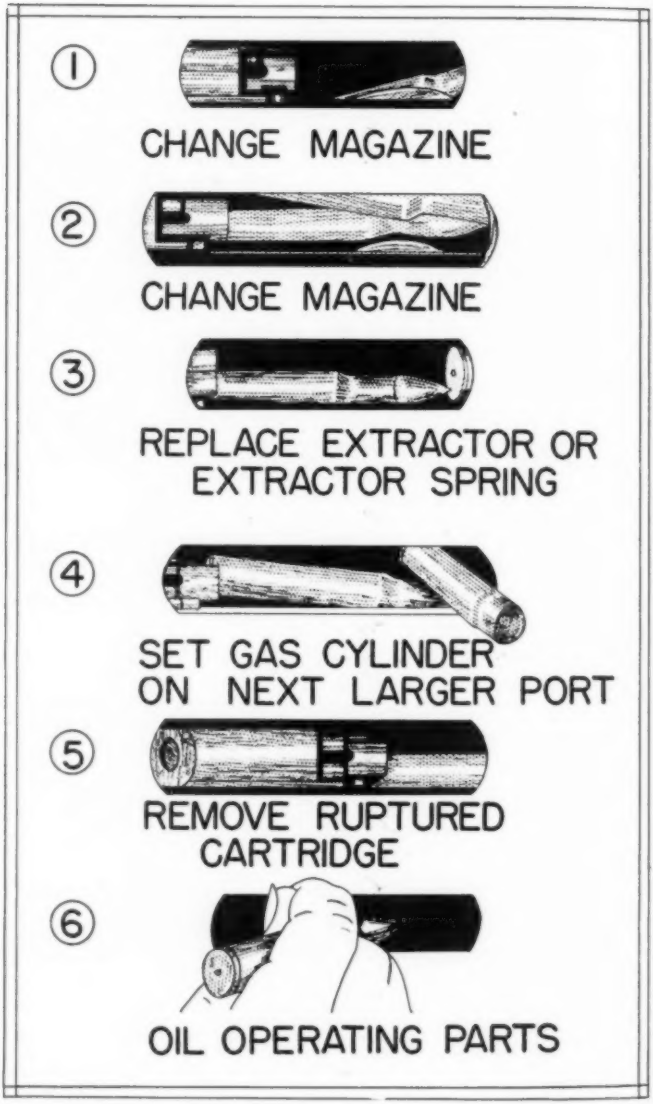

Figure 9. Second phase stoppage chart, BAR.

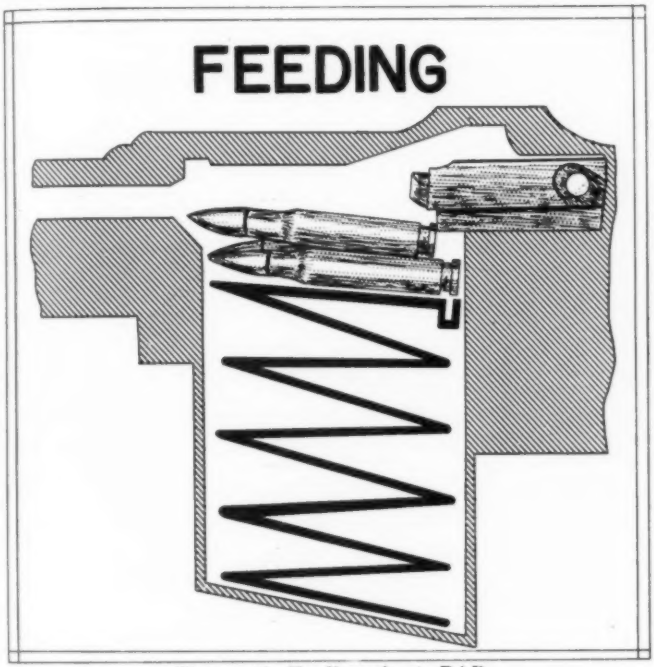

Figure 10. Feeding chart, BAR.

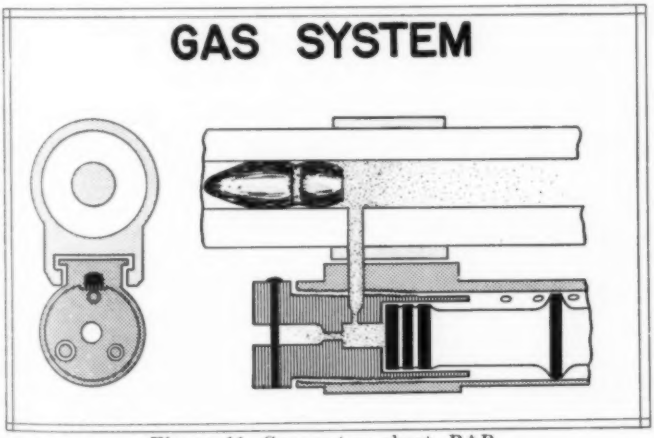

Figure 11. Gas system chart, BAR.

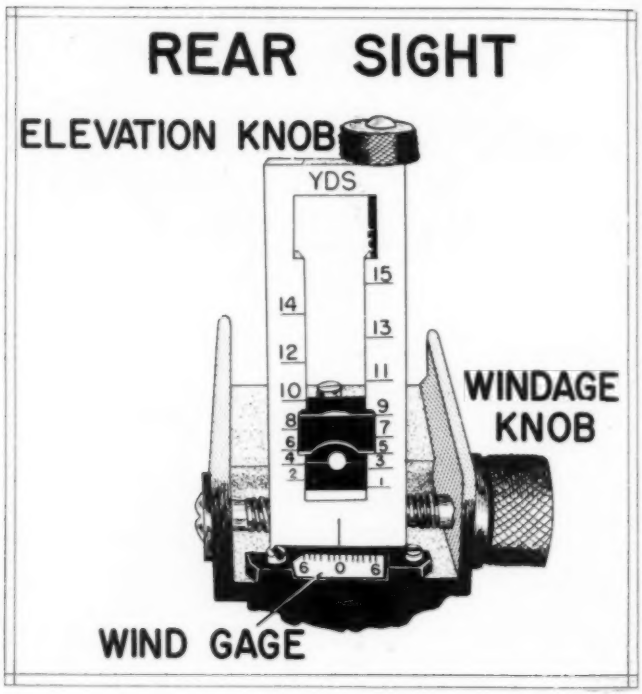

Figure 12. Rear sight chart, BAR.

portion of Figure 95 of Field Manual 23-15 blown up to the dimensions of a "D" target and transferred to pieces of target cloth. Any number of charts of this type, illustrating all the shot groups to be encountered, can be prepared for this phase of training. This instructional aid can be used on the range as well as during periods of preparatory marksmanship.

CARBINE

Instructional aids used with this weapon, other than working models of its groups, are similar to those used with the M1 Rifle.

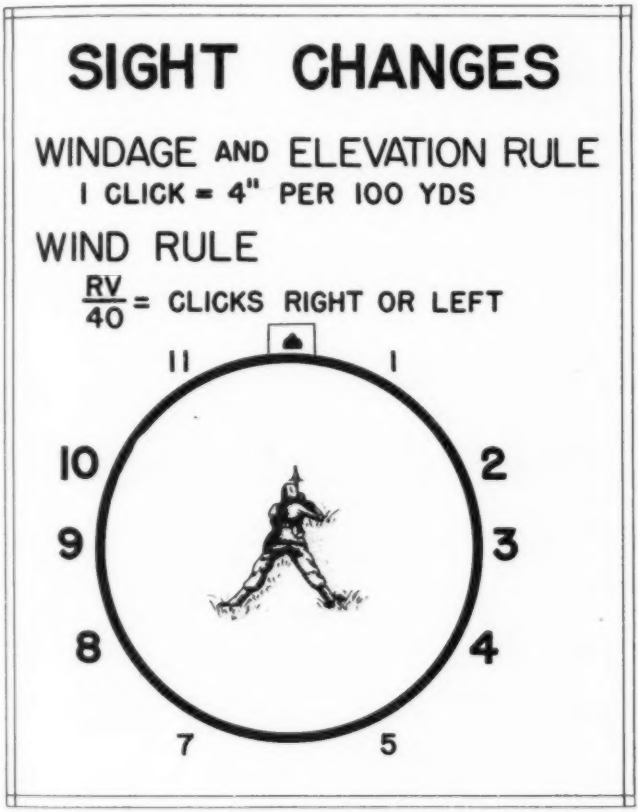

Figure 13. Clock system chart.

SUBMACHINE GUN

The Infantry School believes that instruction covering the functioning of this weapon can be presented adequately through the use of the weapon alone. This is due to its extreme simplicity. For classes in preparatory marksmanship with the submachine gun, certain marksmanship charts and other miscellaneous equipment are of considerable assistance.

AUTOMATIC PISTOL

Instructional aids used in preparatory marksmanship training with the automatic pistol are similar to those used with other small arms. They are covered fully in Field Manual 23-35.

DISASSEMBLY TRAINING AID, ALL SMALL ARMS

Another instructional aid, simple to make yet extremely effective, is the disassembly training mat. (See Figure 14.) Since nomenclature is never taught as a separate subject,

U. S. RIFLE, CAL. .30, M1
2 BARREL AND RECEIVER GROUP
4 OPERATING ROD SPRING AND FOLLOWER ROD
5 FOLLOWER ARM PIN
6 BULLET GUIDE
7 FOLLOWER ARM
8 OPERATING ROD CATCH ASSEMBLY
9 FOLLOWER
10 OPERATING ROD
11 BOLT ASSEMBLY
1 TRIGGER HOUSING GROUP
16 GAS CYLINDER LOCK SCREW
12 EXTRACTOR
13 EXTRACTOR SPRING & PLUNGER
14 EJECTOR & EJECTOR SPRING
15 FIRING PIN
3 STOCK GROUP

Figure 14. Disassembly mat.

but concurrently with mechanical training, the disassembly training mat serves as a most effective means of combining the two subjects. This aid is nothing more than a tabletop size piece of canvas, target cloth, or similar material on which the various parts of the weapon are outlined or painted in actual size and the nomenclature lettered alongside each part. As the student disassembles the groups, each part is laid out on its appropriate place on the mat.

SUMMARY

The instructional aids illustrated and discussed are but a few of the many used in teaching the army's weapons. These aids are not necessarily the best to be found nor is their use mandatory, although they are being used with great success. An aggressive instructor can adapt these aids to his own use or he can develop new ideas which will enable him to use new approaches to his subject.

Technique of Instruction: The Lesson Plan*

Compiled By Captain Marvin J. Berenzweig, Infantry

Lesson plans do not have to be elaborate. A lesson plan written on the back of a laundry slip can be equally as helpful to the lieutenant instructing his platoon as the beautifully typed and paragraphed form. The slicked-up version may be the pride of the regimental files, but its rough-edged brother is often the practical work-horse in the field.

This statement is not an invitation to laziness. The only test of a lesson plan, whatever it looks like, is: Does it help you, the instructor, to get your knowledge across to the class? If it does, what more can be asked of it? If it doesn't, its worthless.

With experience you can write in five minutes a lesson plan that will carry you through two hours of instruction. The inexperienced instructors waste hours in the actual writing, which doesn't count at all. It's the background of knowledge and thought that goes into the plan that counts. It's not how much you write, but *what* you write. The knack lies in getting the high-lights down in logical sequence.

Good lesson plans are invaluable. Look at it this way: Suppose you're an authority on the Browning Automatic Rifle, you know it like the palm of your hand. Does this mean that you can get up in class and impart your knowledge to others without some sort of plan for presenting the information step by logical step? No, it doesn't. You need a plan. Actually, knowledge and the technique of giving it to others are two different things. They are dependent on each other for successful instruction, but they are different.

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*NOTE: First of a series of short articles for the INFANTRY SCHOOL QUARTERLY on the Technique of Instruction.

Lesson Plan

Subj: Descrip of AR Cal .30, M1918A2 w/b, disassemble and assemble the operating group.

Checklist —

Date: 22 Feb 49 (0945-1145) Class: 2d Plat A Co

Area: behind A Co sup rm (rain, inside A Co bgrm)

Instr: Sgt Brown and Sgd Obrs

Ref: FM 23-15 (30 Jul 43, C1-2) par 1-7, 8a, 8b(1), ~~8c~~ 8c(1), 9c, 203-205.

Equip: 8 used ARs, dummy cartridges, magazines belts, mats, cleaning stuff, GTA 9-6, projector 16mm Card, FS 7-74, pointer.

Insp: Class B Release: 21 Feb 1500 Check FS.

OBJECTIVE: To introduce the soldier to the AR and teach him how to disassemble and assemble the operating group.

Outline —

1. Intro (show AR to class) 5 min
   a. Importance - Combat etc.
   b. Tie-in with what they already know.
   c. Objective.
2. Explanation 25 min
   a. Introduce and show film strip 7-74.
   b. Discuss it ← (important points)
   c. Summarize
3. Application 65
   a. Set-up for "Controlled" method (FM 23-15, par 203-205) (DISPLAY GTA 9-6)
   (10 min BREAK 1045-1055)
   b. Disassembling phase (par 8a 8b1, 8c1)
   c. Assembling phase (par 9c)
   d. Repeat practice as needed
4. Final Summary 5
   a. Questions, if any
   b. Repeat main points

1145 - FINISH

Figure 1

Lesson plans are a small but important and integral part of the instructor's technique, his preparation for the lesson. Defined briefly they are to the instructor what a road map is to the traveler, a blue print to the engineer. They include a list of preparation data and an outline which shows what material is to be taught, in what order it is to be taught, and exactly what procedures are to be used.

The plan shown in Figure 1 may well have been written on the back of a scrap of paper. Nevertheless it has all the essential reminders and is therefore a good plan. One guesses that it took little time to write but that a lot of sound, logical thought went into its preparation. Study it closely and you'll see that nothing important has been left out, nothing superfluous included.

This plan has definite form. It starts at the beginning and ends at the finish, as it should. It doesn't commence at the middle and spread out in all directions. Not the least important elements are the items in the checklist, without which the instructor might easily overlook the important small things that can confuse or negate otherwise excellent instruction.

Note the objective of the lesson. The class wants to know the objective of this two hour period, and the instructor is making sure that he does not flounder around in generalities—a frequent fault.

Observe the *outline*, how it proceeds gradually, logically into the subject; how it guides the instructor as he unfolds his information. The instructor must realize that often the class will know little or nothing about the subject, that it must be led by careful stages into the heretofore unknown. He must accurately judge the class level of understanding; otherwise his considerable knowledge will go in one ear, meander hopelessly in confused minds, and exit by the other ear. Too often this wasted effort is the result of a poorly conceived lesson plan. The instructor cannot rely solely upon his own undoubted knowledge—he must guide the giving of that knowledge by a preconceived outline.

Is the form of the plan in Figure 1 adaptable to any subject? It is. It's elastic. Try it for yourself. Try it, for example, on Map Reading. On Military Justice. On Close Order Drill. On any subject. The sequence of the entries are time proven—only in the words you write need it differ. In writing those words it is well to remember that the time consumed in preparation is better spent in sound consideration of content than with an eye to beauty. Lesson plans don't have to be fancy to be good.

Airborne Infantry Regimental Operations

Compiled by Lt. Col. John N. Davis, Infantry

An airborne operation is not unique in all its aspects. In many ways it can be likened to an amphibious operation. In both we have the pattern of an assault by troops specially trained to seize an initial objective—an airhead in one and a beachhead in the other. The assault phase is followed in each case by the landing of heavy equipment and supplies to strengthen the initial lodgment. Finally in both types of operation comes the landing of follow-up units to consolidate and exploit the initial gain. The two operations differ principally in their mode of transport. Amphibious troops assault from small boats—airborne troops land by parachute; seaborne troops support the initial landing with troops and supplies brought ashore by landing craft—airborne troops use gliders; and in the exploitation phase, amphibious troops employ large ships while the airborne use heavy gliders and airplanes. (See Figure 1.)

Figure 1. Heavy gliders and airplanes transport troops and supplies for exploitation phase.

The relationship between Army and Air Force commanders in an airborne operation is similar to that of Army and Navy commanders in amphibious operations. The Navy commander can't merely dump the troops he is transporting onto a beach, toot a blithe farewell, and steam off to his base for a well earned leave. Neither can the Air Force toss the paratrooper a jaunty salute and wing away to distant airfields, its job completed with the initial landing. In both cases the Army commander must rely on his Naval or Air Force counterpart not only to transport his troops but to protect, support, and supply them on their objective.

Similarities between these two types of operations exist right down to the individual soldiers themselves. The combat loaded amphibious soldier is about as much of a packhorse in the assault as his airborne parallel. Both men serve as the means of transportation for much of the equipment and supplies needed for the survival of themselves and their units in the critical early part of their respective operations.

This comparison could be continued at some length, for the general pattern is the same.

FAVORABLE CHARACTERISTICS OF AIRBORNE FORCES

It is not to be inferred from the foregoing similarities that an airborne operation is merely a duplication of an amphibious operation in another transportation medium. Airborne forces possess characteristics that are completely peculiar to themselves. Predominant among these is a degree of strategic mobility. Here, if ever, is a force which can "hit 'em where they ain't." It affords the maximum opportunity to deliver effective ground attacks over great distances in the minimum time. Moving so much more rapidly than ground or naval forces, spanning bodies of water, crossing mountains, and enemy-held territory, the very existence of airborne forces with their inherent speed, surprise, and flexibility makes them a powerful strategic threat. This strategic importance continues until they are committed when they adopt a tactical role.

A worried enemy must not only concern himself with *where* his airborne opponent will strike but *when* he'll arrive. Airborne forces can attack by day or night forcing a 24-hour alert. Night operations are less vulnerable to enemy air attacks and ground action and are more likely to achieve surprise. Daylight operations, on the other hand, affording better visibility in the air and on the ground, can be carried out with greater accuracy. In general, the advantages of daylight landings outweigh those of night landings and, based on present means and methods, airborne operations normally will be conducted during daylight. This does not preclude specific missions at night when they are required to give maximum assistance to the main effort.

Training for the operation in rear areas well removed from the scene of action, airborne troops rehearse the marshaling, loading, air movement, landing, reorganization, and ground techniques on terrain similar to that of the objective. Here relatively free from enemy action, they bring combat efficiency to a peak. (See Figure 2.)

The enemy, meanwhile, suffers a deterioration of morale. The speed and surprise of an airborne attack is a constant threat to him, and an actual attack will push him still further off balance. He has difficulty forming an accurate intelligence estimate of the situation because he cannot be sure whether the airborne attack is a diversion or a main effort. He hesitates to maneuver his own forces to oppose the threat until the situation is fully developed.

An airborne attack in the enemy's rear actually opens up a new front. By suddenly occupying key positions, airborne forces disorganize the enemy and decrease his capacity for coordinated action.

UNFAVORABLE CHARACTERISTICS

Bad weather affects airborne operations more than ground operations. The airborne force planning an operation carefully considers long range and short range weather forecasts. Dependent upon aircraft not only to transport troops into combat but also for supplies and reinforcements,

it cannot afford to start an operation in the face of forecasts of weather that would ground its aircraft. Plans require sufficient flexibility to permit last minute changes in the event of unexpected changes in the weather.

Figure 2. Airborne troops rehearse and train far from the scene of action.

The airborne force is particularly vulnerable at various stages of an operation and is susceptible to certain types of attack. During descent and immediately after landing the paratrooper is wide open to enemy action. This disadvantage can be overcome partially by jumping at low altitudes or at night. The minimum safe altitude for a jump is about 400 feet although successful jumps can be made from

much lower elevations. Gliders, too, are released at minimum altitudes to expose them for as short a time as possible during the descent. Immediately after landing, airborne troops, initially scattered and disorganized, are highly vulnerable. While not a remedy, quick assembly into tactical organizations and rapid recovery of weapons and equipment minimizes this critical period.

After landing, airborne troops are restricted in maneuver. Limited in transportation, the weight of weapons, ammunition, and supplies which must be handcarried, reduces distances they can traverse. During the war this was an extremely unfavorable characteristic. However, progress in aircraft development is increasing the type of divisional transportation which can be moved by air. (See Figure 3.)

Figure 3. Progress in aircraft development increases types of divisional transportation which can be moved by air.

Armored attack is the particular bugaboo of newly landed parachute forces which rely initially only on rocket launchers, recoilless rifles, and antitank mines for antitank pro-

tection. For ultimate success in repelling armor, paratroopers must depend on glider transported elements arriving in time to bolster their antitank defenses. Gliders transport heavier weapons to include artillery. In addition, in daylight operations, tactical aircraft can assist in neutralizing enemy armor.

An airborne operation cannot be a spur of the moment affair. So much coordination, training, and rehearsal is necessary that the use of airborne troops should be anticipated as far in advance as possible to allow the maximum time for planning. Coordination must be worked out with supporting aircraft, both tactical and troop carrier, and with ground forces which will link up with the airborne units. If the airborne operation involves over water flight or if it is in conjunction with an amphibious assault, very close liaison must be maintained with both naval and amphibious forces. In the first large scale joint airborne and amphibious operation of World War II, the failure to recognize the need for effective coordination was disastrous.

An airborne division requires at least seven days for complete preparation for an operation. However, if a definite advantage can be gained by using airborne troops to reinforce an isolated unit, to block an enemy retreat, or to exploit success, then they should be committed even though some desirable planning procedures must be eliminated.

Ground reconnaissance prior to an airborne attack usually is not feasible because objectives are normally in the rear of enemy front lines. Airborne units, marshaling for an attack in rear areas hundreds of miles from the objective area, ordinarily base their plans on aerial observation, study of aerial photographs and maps, and on intelligence reports. (See Figure 4.)

Every effort is made to furnish the airborne forces reliable and up-to-date information prior to the attack. The success of an airborne operation may hinge on knowledge of last minute changes in the enemy situation. An excellent example is that of a glider-borne assault in Burma involving three divisions. Only two hours before the first gliders were due to take off a reconnaissance plane returned with

photographic evidence that the Japanese had placed obstacles on some of the proposed landing zones. Plans were hurriedly changed and the gliders scheduled to use these zones were diverted to others. The first gliders took off within an hour after the scheduled time and the operation was a success. Had the original obstacle-studded landing zones been used the result might have been disastrous.

Figure 4. An airborne unit becoming familiar with its assault area through use of relief maps.

Airborne troops don't leap into the assault as soon as they touch foot to the ground. They, of necessity, are dispersed on landing. This is particularly true of parachutists. Dispersion is influenced by wind, navigational difficulties, visibility, variations in flight formations, altitude of the planes, the terrain, and the experience of the air crews and the troops they transport. Members of a rifle squad or gun crew, dropped by parachute, may be separated by as much as 50 yards between men, and the distance from the first to the last man may be several hundred yards. Unit commanders gain control only after individuals assemble. Troops landed by gliders are not as subject to

dispersion as parachutists since squads and even platoons may land as tactical units in a single glider. Dispersion of gliders depends on terrain, landing characteristics of the gliders, and the skill of the glider pilots.

The amount of equipment, transportation, and supplies that can accompany them into combat or that can be brought in by air limit the ability of airborne forces to initiate and maintain ground action. If a link-up with advancing ground forces is to be made within a few hours, this problem is not particularly acute, but if the link-up is not expected for several days or longer, the supply problem becomes increasingly difficult. As a rule of thumb, an airborne division can maintain effective ground action for forty-eight hours without reinforcements or resupply. If more than forty-eight hours elapse between the airborne assault and a link-up, the unit must be resupplied with ammunition, food, water, and medical supplies by air. In other words, placing an airborne force on the ground is only the preliminary phase of an airborne operation. Once on the ground, they must be supplied as any other ground force. This provides an additional hazard. A shortage of aircraft, effective antiaircraft fire, enemy air action, or bad flying weather may seriously affect the ability to resupply the airborne force on the ground.

Large operations require air superiority. Troop carrier aircraft are unarmored, relatively slow and can take only limited evasive action. Air superiority must be attained not only to land the troops, but also to insure the uninterrupted flow of air supply. Small scale operations with limited objectives can be executed even though the enemy has air superiority if decisive results can be expected. In such cases the enemy's air superiority can be overcome temporarily by massing friendly fighter protection, by night landings, or by sheer surprise.

MISSIONS OF AIRBORNE FORCES

Airborne forces are not lone wolves. Their basic mission is to move by aircraft in order to attack, seize, and hold important objectives pending the arrival of other ground

forces, and to occupy or to reinforce important areas beyond the immediate reach of other ground units. Airborne troops are essentially offensive troops. However, after seizing an objective their mission will usually be to hold it pending arrival of reinforcements by land, sea, or air.

Seizing, holding, or otherwise exploiting important localities in conjunction with other forces was the most common wartime airborne mission. Usually an airborne force landed in advance of ground or naval forces and a link-up with ground or naval transported forces was expected within a few hours. This type of operation was made in Holland when the allies, attempting to turn the flank of the Seigfried Line, landed an airborne corps along the route of the break-through with the mission of capturing vital bridges.

Airborne forces can attack the enemy rear and assist the main force in making a break-through. The airborne force lands directly in rear of the enemy's front lines and attacks his front line positions. This was the type mission performed in the airborne landings on the east bank of the Rhine in conjunction with the river crossing of ground troops in March 1945.

Airborne forces can be dropped behind a defensive position while a frontal ground attack is launched against the same hostile position. The airborne assault halts enemy reinforcements and isolates the battle area. An example was the landing of airborne forces in the amphibious invasion of southern France.

Disrupting enemy communications and supply lines is always a supplementary mission for any airborne force. It can aim at destruction or seizure of key installations such as bridges, railroads, atomic energy plants, guided missile sites, communications centers, supply installations, locks, dams, and public utilities. Such a mission might take the form of a raid followed by prompt withdrawal by air or by infiltration.

Airborne forces are used to delay a retreating enemy until the main forces can overtake and destroy him. This mission is accomplished by landing astride the enemy's escape routes and destroying bridges, laying mine fields,

or defending defiles. Rarely assigned to large airborne forces because of the time required to make plans, this mission can be given to a small unit such as a regiment or battalion which can be employed on such a mission on relatively short notice.

Because of their speed and mobility, airborne units are well qualified to reinforce threatened or surrounded units. When the Salerno beachhead was threatened one regiment of parachutists was dispatched from Sicily as reinforcements. Within eight hours after the regiment was alerted it was in the front lines.

Frequently airborne troops can seize islands or areas not readily accessible to other ground forces with comparative ease. The German airborne attack on Crete is the classic example. Another example is the recapture of Corregidor Island by one combat team of parachutists.

Capture of an enemy air field or of a site on which an air field can be easily constructed is a very important mission for airborne forces. Initially the air field is used to land reinforcements and supplies. Later, air-transported infantry divisions can reinforce the airborne force and friendly combat aviation can use the captured field. At Lae, New Guinea, one parachute combat team seized an airstrip on which an Australian infantry division was airlanded within a few days.

A look into the future immediately discloses the need for a very long-range striking force capable of being committed on short notice at any one of a number of objectives. Initially speed will be the primary factor and all logistical support will be by air. An eventual link-up with other forces will be planned, but it may come many days after the airhead is established. An airborne corps or army may be the initial assault force. When the airhead has been established, a build-up will be made with air-transported units until the force is sufficient to gain success.

COMPARISON OF AIR-TRANSPORTED, GLIDER, AND PARACHUTE ELEMENTS

Airborne troops are trained and equipped to make assault landings by parachute or glider. However, an airborne

operation may also involve the use of cargo airplanes to reinforce and resupply the assault airborne troops. Let us consider each of these means of entry into the area of operations from the viewpoint of capabilities and limitations.

TRAINING. Parachute troops require special training. (See Figure 5.) Gliders or airplanes, on the other hand, can be used to transport units which have had a minimum of special training. The emphasis on individual training need not be so great since the tactical integrity of small units is maintained. Infantry divisions also can make landings by airplanes and by gliders after a short training program on loading and unloading equipment.

Figure 5. One type of special training given parachute troops; group practicing landing falls.

LANDING AREAS. The type of landing areas in the objective area may determine the type of assault. Cargo aircraft require existing air fields or landing strips. In some few cases, landing strips can be prepared with comparative ease, but in most cases construction of a landing strip requires considerable effort, time, manpower, and heavy

equipment. Glider landings require relatively level terrain free of obstacles. Parachutists, however, can land on any terrain which is free of obstacles dangerous to an individual.

WEATHER. Gliders are much more sensitive to poor weather or antiaircraft fire than airplanes carrying parachute troops.

CAPACITIES. Gliders can land heavy vehicles and equipment on terrain which is impracticable for powered aircraft. However, small vehicles and light weapons can be dropped by parachute on a wide range of terrain. Recent experiments prove that jeeps and 105-mm howitzers can be dropped by parachute from C-82 airplanes. Thus, where a build-up of air-transported troops and heavy equipment is not essential to the mission, parachute operations can be carried out on very difficult terrain.

SPEED AND DISTANCES. The operational radius of action is greater for parachute operations than for a glider or air-transported operation. Parachute troops can be delivered into an area faster than glider or air-landed forces. (See Figure 6.) However, airplanes and gliders can deliver heavier, better organized, and more powerful units.

AVAILABILITY. Finally, we must consider the fact that gliders, as a rule, can be used only once in an assault operation, whereas powered aircraft can make successive trips to the airhead carrying parachutists or air-transported units. When excellent landing zones are available, many gliders may land without damage. Undamaged gliders may be evacuated by the "snatch" technique; however, emphasis is always on getting troops, supplies, and equipment into the airhead, rather than on evacuating gliders.

ORGANIZATION FOR THE ATTACK

Thus far we have talked only of considerations which apply to airborne forces as a whole. Let us proceed now to a discussion of the actual attack preparation of airborne regiments and battalions.

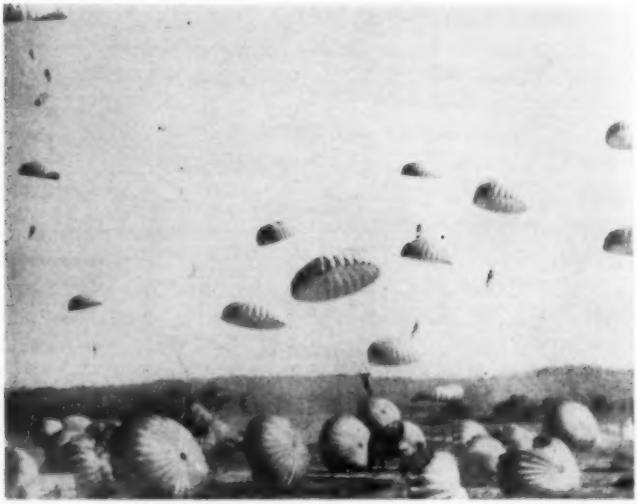


Figure 6. Parachute troops can be delivered into an area faster than glider or air-landed forces.

The airborne division customarily organizes into three regimental combat teams for the assault landing. Combat teams land in separate combat team landing areas. A combat team organization permits the airborne infantry regiment to operate more or less independently during the initial stage of the attack. As soon as the ground situation is stabilized and the division commander can coordinate and control his regiments, the regimental combat teams are dissolved and the division resumes its functions.

An airborne infantry regiment may land as battalion groups on separate battalion drop zones or it may land on a single regimental drop zone. A battalion group consists of an airborne infantry battalion and the necessary reinforcements. Attachments for these groups are made to infantry battalions early in the planning phase and may be withdrawn as soon as the regimental commander can control his units.

The airborne infantry battalion is the basic tactical unit. It normally emplanes on one air field, flies to the objective

in the same aircraft serial, and drops or lands on the same drop or landing zone.

The personnel and equipment of an airborne regiment are divided into assault, follow-up, and rear echelons. Parachute and glider elements committed to seize the airhead compose the assault echelon. (With the gliders which are now being developed, most of the equipment of the regiment can be transported in the assault echelon; follow-up and rear echelons will be greatly decreased or eliminated.)

The follow-up echelon includes those combat troops and equipment not included in the assault echelon which join the assault echelon as soon as possible after the initial landing. The follow-up echelon may move to the combat area by land, sea, or air.

The rear echelon includes the troops not considered essential for combat or which are left in the rear to perform administrative functions. The rear echelon of the regiment usually includes the personnel section, guards for organizational equipment, and men physically disqualified for airborne assault landings. The rear echelon is kept to the bare minimum. It may remain at the rear base if the regiment is to be relieved at an early date, or it may rejoin the regiment in the combat area if the regiment is committed for a prolonged period.

SELECTION OF LANDING AREAS

Landing areas cannot be selected hit or miss. The location of drop and landing zones for the assault echelon will greatly influence the plan of maneuver. Their selection is a joint responsibility of the airborne commander and the troop carrier commander. The airborne commander selects general areas which are suitable for the accomplishment of the ground mission and the troop carrier commander selects specific drop and landing zones within the acceptable area. Final selection of landing areas is usually coordinated at the airborne division level or higher. However, regimental commanders usually participate in preliminary planning at division level and may thus influence the selection of drop and landing zones for their units.

Landing areas are selected so as to:

(1) Be easily identifiable from the air under the expected conditions of visibility.

(2) Be capable of a straight approach by aircraft.

(3) Be sufficiently close to the objective to permit surprise.

(4) Provide cover and concealment for reorganization, especially for daylight landing.

(5) Be relatively free of obstacles.

(6) Be near good defensive terrain.

(7) Be near covered routes of approach to the objective.

(8) Be near a favorable road net.

(9) Be capable of mutual support with other landing areas.

(10) Permit a favorable disposition of troops for the attack.

(11) Be large enough to accommodate the troops designated to land on them. (As a guide, a battalion can parachute into an area a thousand yards square.)

Pathfinder serials usually precede the main parachute serials to drop pathfinder teams who place and maintain navigation aids on the drop zones. (See Figure 7.)

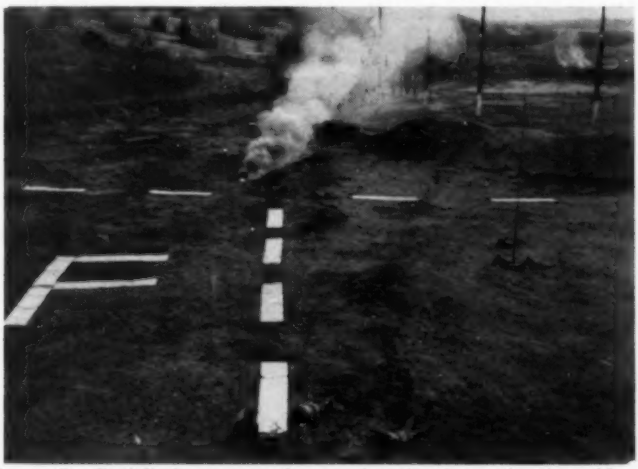


Figure 7. Pathfinder teams place and maintain navigation aids on the drop zone.

LANDING THE ASSAULT ECHELON

Once the operation begins parachute serials normally precede glider serials to permit parachute troops to clear the glider landing zones. Assault battalions and their organic weapons normally land by parachute. The regimental command group usually accompanies one of the assault battalions. Supporting weapons are included in the parachute element whenever practicable. However, consideration is given to mobility of supporting weapons after the landing; weapons which are capable of delivery by parachute but difficult to manhandle on the ground may be landed in gliders unless their prime movers or weapons carriers can accompany them in the parachute element. As much equipment as practicable is attached to individual parachutists to increase their readiness for action upon landing and to speed up reorganization. Additional supplies and equipment are dropped in separate containers by parachute. (See Figure 8.) The time required for dropping the parachute element of a reinforced regiment may vary from 5 to 15 minutes depending upon the type, number, and speed of the aircraft and the density of their formation.

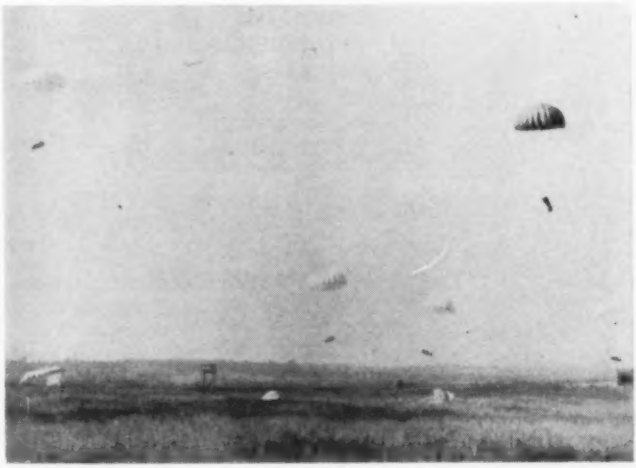


Figure 8. Additional supplies and equipment are dropped by parachute.

The glider element of a regiment consisting of regimental transportation, heavy weapons, and equipment may land on the regimental landing area or on a separate area controlled by division. Glider pilots come under command of the airborne troop commander upon landing and may be assigned a mission in ground combat. The personnel in the glider unload all equipment and supplies immediately upon landing. The time required for landing gliders depends upon the same factors as for parachute troops and upon the skill of the pilots, the landing area, and the landing characteristics of the gliders. Gliders can land at a rate of 18 to 25 per minute from a single air column.

REORGANIZATION

Extremely vulnerable to hostile ground attack on landing, the regiment reorganizes with all possible speed and precision. When necessary, security may be sacrificed for speed in assembly and regaining command control. Regiments reorganize according to a prearranged plan using predesignated assembly areas, assembly aids, and identification markings for personnel and equipment.

The regimental commander designates assembly areas for his units. The following characteristics are desirable for assembly areas:

(1) Location in the direction of the objective to prevent countermarching.

(2) Near the drop and landing zones to speed up reorganization.

(3) Terrain which provides for a favorable disposition of troops for the attack.

(4) Provision for cover and concealment.

(5) Adequate size.

(6) Freedom from enemy troops or small-arms fire.

(7) Proximity to favorable routes of approach.

(8) Easy identification on the ground.

Assembly areas are identified on the ground by prominent landmarks such as hills, roads, or heavy woods. Immediately after landing, the assembly areas are further identified by means of assembly aids. For daylight assembly these

aids include flags, smoke, flares, and special electronic devices. For night assembly the aids include lights, flares, fluorescent panels, white tape, sound signals, infra-red, and other electronic devices.

To speed up reorganization a control point is established on the landing zone, usually near the assembly area. Guides from each unit report to the control point promptly after landing to direct troops to their respective assembly areas. When battalion assembly areas are widely separated each battalion sets up its own control point.

Radio nets are opened immediately after landing to facilitate reorganization and control. Battalion and separate unit commanders periodically report their status in terms of troops and equipment until assembly is complete.

The first parachute units to land secure the landing areas. The size of the security force depends upon the expected enemy situation, the terrain, and particularly on enemy routes of approach. Other parachute units assemble by plane load on the drop zone and move promptly to their assembly areas, carrying with them all equipment needed for the attack. Troops landed by glider move directly to their assembly areas by glider loads. Glider pilots move to unit assembly areas and organize into tactical units under their own officers.

The regimental commander begins his ground reconnaissance immediately upon landing. Patrols reconnoiter routes of approach and the objective, and seek enemy information.

Reorganization is complete when all units are assembled and communication channels are established. Battalions should be ready for action 30 to 60 minutes after landing.

Units or personnel which are landed outside the designated area assemble as rapidly as possible under the senior commander in the area and establish contact with their units as soon as possible.

GROUND ACTION

As soon as the regiment organizes, its actions are governed by the same doctrine and principles as other infantry

regiments. However, certain limitations are imposed by the nature of an airborne operation. Then, too, the method of entry into combat requires the airborne regimental commander to give special consideration to conditions which do not apply to other ground units. He considers:

(1) Possibility of engagement immediately following the landing, before effective command control can be regained.
(2) Lack of armored support.
(3) Lack of medium and heavy artillery support.
(4) Exposure from flanks and rear.
(5) Limitations of ammunition and other supplies.
(6) Limitation of transportation.

The battalions move out on their assigned mission when assembled, or on order. When lines of departure are used they are selected according to standard doctrine but the speed with which battalions move to their objectives usually precludes a formal deployment along lines of departure. Frequently battalion assembly areas serve as attack positions. If the objective is distant and only light enemy resistance is expected, assault battalions use an approach march formation when leaving their assembly areas.

During movement to the objective, security detachments protect the flanks and rear and maintain contact with adjacent units.

During the attack, emphasis is placed on aggressive action by small units. Squad and platoon leaders attack aggressively and are prepared to meet unforeseen contingencies.

Ideally, enemy resistance is reduced quickly, critical points are seized, and all attempts at organized resistance are frustrated before the enemy recovers from the first surprise blow.

Antitank weapons cover approaches favorable to hostile armor, paying particular attention to the flanks and rear of the battalion. Regimental antitank weapons may be attached to battalion or kept under regimental control.

The heavy mortars and battalion supporting weapons support the assault continuously just as in normal ground attack. During the initial stages of the attack, however,

a lack of weapons carriers restricts the forward displacement of weapons which are not easily hand-carried, and may limit the supply of ammunition.

SUPPORTING ARMS AND SERVICES

Hardly an airborne assault could be mounted without the assistance of combat aviation. In addition to gaining air superiority, isolating the battle field, and neutralizing targets in the objective prior to the assault, it provides air protection during the air movement phase and close support of the airborne units during the ground assault. In the close support of troops in the objective area, cooperating aircraft augment artillery and antitank and antiaircraft weapons which are usually present in limited numbers, particularly during the initial stages of the ground action. Combat aviation also supplements the striking power of assault troops compensating in part for the absence of friendly armor. One or more radio-equipped tactical air control parties (TACP) usually parachute with the regiment to direct and coordinate tactical aircraft during the ground action.

Artillery support during the initial stages of the attack is usually limited to the artillery units which accompany the regiment into combat. Light artillery landed by parachute or glider may accompany or closely follow the infantry troops in the initial landing and provide close support during the reorganization phase and the initial assault. Medium artillery can be landed by heavy glider and by powered aircraft after the landing areas have been secured or airstrips captured and repaired. Normal principles for the employment of field artillery apply within the restrictions imposed by the limitation of transportation and ammunition, decentralized control, and the difficulty of reorganizaiton.

The use of antiaircraft units follows standard doctrine. The regiment has no organic antiaircraft artillery units but may have divisional antiaircraft units attached. At present self-propelled antiaircraft artillery weapons cannot be landed in assault gliders.

Combat engineers are usually attached to the regiment for the assault landings. A battalion may have engineer

units attached or in support. The use of airborne engineer units is the same as standard engineer units within the limits of available transportation and heavy engineer equipment. In addition to usual engineer missions, airborne engineers may be used to remove obstacles to glider landings or to construct and maintain airstrips.

Supply and evacuation during an airborne assault is necessarily by air until a link-up can be made with other ground forces. Supplies which accompany the units into the airhead are carried on individuals, in aerial delivery containers, or in vehicles. The quantity of supplies carried by assault troops depends on the initial combat requirements the carrying capacity of the aircraft, the availability of aircraft for air drop or glider tow, and on the availability of supply by either air-landed or normal ground means.

Casualties are held at medical installations in the airhead until either a ground juncture has been effected or air evacuation is possible. Casualties are usually accumulated and evacuated after a forward air field has been established In operations close behind enemy lines some evacuation may be accomplished by glider, helicopter, or conventional light aircraft.

Supply and evacuation by air is normally planned and coordinated at division or higher level. Supply and evacuation procedures within the airborne infantry battalions on the ground are essentially the same as those of the standard infantry battalions.

The amount and type of communication equipment that accompanies assault parachute troops is limited. Equipment carried on the individual parachutist or dropped by aerial delivery containers must be capable of being hand-carried. Vehicular mounted radio sets are brought in by glider or airplane.

For ground combat the airborne infantry battalion has essentially the same communication facilities and employs the same communication technique as the standard infantry battalion. Radio is the principal means used during the airborne assault. Command channels are established immediately upon landing and fire control channels are established during the reorganization. Radio contact with cooperating

tactical aircraft is made by tactical air control parties. Wire communication is not usually laid during the initial phase of the airborne assault because of the weight of material, the time required for installation, and the rapidity of the action. As soon as the situation permits, wire supplements radio.

During ground combat, messengers, air ground recognition panels, pyrotechnics, pigeons, and sound and visual signals are employed as in normal ground operations.

DEFENSE

Upon capture of the final objective, which is usually that portion of the airhead line in its zone of action, units go on the defensive. The conduct of the defense generally follows the doctrine for defensive combat for *standard* infantry units within the limitations imposed by shortages of troops, weapons, ammunition, supplies, and heavy equipment.

After a link-up has been made with ground forces, an airborne unit may be relieved to prepare for further airborne missions. The decision as to whether the regiment will continue to participate in the ground action is made at high levels.

When the airborne infantry regiment receives a proportionate share of the airborne division standard attachments for sustained combat, it can fight side by side with *standard* infantry regiments on a basis of equality in strength and armament.

Attack on D'Horn

By Captain Arvid P. Croonquist, Jr., Infantry

The military action in which everything goes wrong, where casualties are high, and only a thin red line wins through to ultimate victory makes the best blood and thunder story and attracts the most attention.

On the other hand there is the well-planned, competently handled action which may run so smoothly that it is totally lacking in dramatic appeal. Unfortunately it is this type of combat example that is likely to be ignored simply because it has been so well conducted and so quickly successful that it has not compelled attention with heavy casualties or a long delayed victory.

The 2d Battalion, 39th Infantry Regiment, 9th Division, engaged in just such an action early in December 1944. The battalion was ordered to attack over 1,700 yards of wide open ground in broad daylight to seize an objective which was protected not only by the German troops holding the objective itself but further protected by well-organized enemy units in two towns on the right flank. Planning carefully and executing the plan precisely the battalion took its objective in a very short time and with very small losses. It asked for and received plentiful fire support, used that support with professional competence, and accomplished its mission swiftly and surely.

When this 2d Battalion of the veteran 39th Infantry Regiment was ordered back into the lines after a rest in early December 1944, the general reaction was not a disheartened, "Here we go again," but an enthusiastic, "Come on, let's get this war over with!"

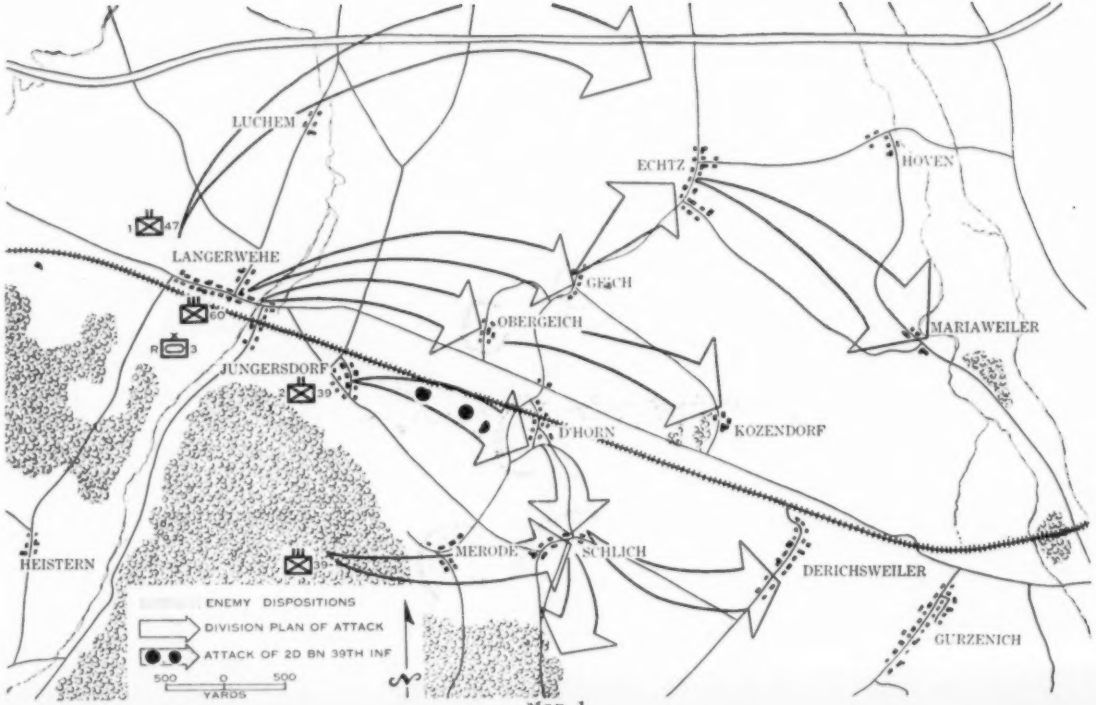
Rested, fresh from a brush up on combat training, actually over-strength because of the return of large numbers of "Purple-Hearters," the battalion was fit and high in

morale. Almost three weeks in bivouac at Camp Elsenborn, 15 miles south of Aachen, had done the trick. The men had acquired a new confidence in each other, a new spirit of teamwork through the battalion's concentration on a series of platoon problems, and, in addition, were in excellent physical shape following a series of conditioning marches plus plenty of good food and relaxation. The battalion was ready to go when, on 4 December, it relieved tired elements of the 1st Division near Langerwehe, a few miles northwest of Duren, and it needed all its resources for the job ahead.

Stiffening German resistance, which had begun at Aachen a few weeks earlier, would not permit a continuation of the swift progress the American armies had made across France and Belgium. Here, on the soil of their homeland, German troops were selling every foot dearly. Ample evidence of this existed along the road to Langerwehe. It was clearly apparent that there had been terrific fighting in this area. The woods had been leveled off at about a 12-foot height by heavy artillery fire; the dead sitll lay along the road—not only German but American; 1st Division rifle companies around Langerwehe were down to 50 men each; and two rifle companies of the division's 26th Infantry had been cut off and captured in the town of Merode, southeast of Langerwehe.

This was the background of the situation confronting the 39th Infantry when it prepared to relieve the 26th Infantry, 1st Division. With no lessening of morale, the 2d Battalion completed its portion of the relief on the night of 4-5 December. Companies E and G occupied the town of Jungersdorf while Company F remained in Langerwehe. (See Map 1.)

When daylight came on the morning of 5 December the companies in Jungersdorf faced a particularly uninviting prospect. Jungersdorf was situated on a ridge; 1,700 yards to the front lay the town of D'Horn; between the two towns was a bare expanse of plain unbroken even by a tree or a bush. If the battalion were to attack across this open ground, and it had little doubt that it would, it would have to cross 1,700 yards of barren ground totally devoid of


LUCHEM
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ENEMY DISPOSITIONS
DIVISION PLAN OF ATTACK
ATTACK OF 2D BN 39TH INF
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Map 1.

cover; terrain that offered the Germans perfect observation and perfect fields of fire for machine guns and other direct-fire weapons. (See Figure 1.)

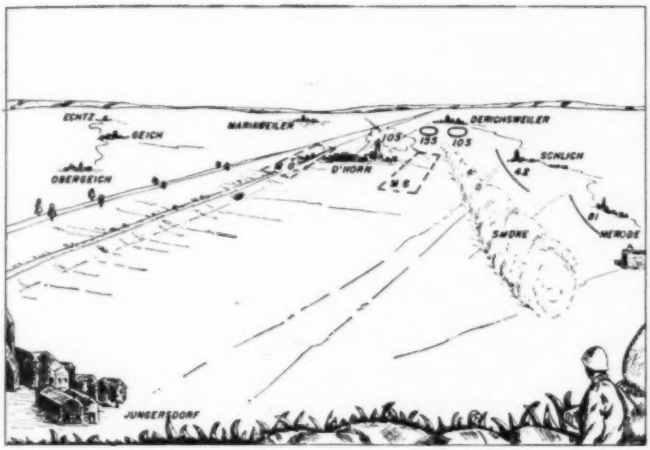


Figure 1.

THE BATTALION PLAN OF ATTACK

On 7 December VII Corps issued an order to attack on 10 December and overcome all German resistance west of the Erft and Roer Rivers. The 104th Division had objectives along the northern corps boundary, the 9th Division had those in the center, and the 83d Division which had relieved the 4th Division was to take objectives in the southern sector. The 9th Division in conjunction with the 3d Armored Division was to take the towns of Obergeich, Geich, Echtz, Kozendorf, D'Horn, Schlich, Merode, and Derichsweiler. (See Map 1.)

The attack plan called for the 2d Battalion, 39th Infantry, to take the small town of D'Horn. This task was odd in that the battalion was to attack from Jungersdorf *after* the 60th Infantry, 9th Division, had seized the towns of

Geich and Obergeich. The occupation of D'Horn would threaten the north flank of the German strong points at Schlich and Merode. Up to this time the enemy in these two towns had kept the Americans pinned to the edge of the woods at the base of the hill west of Merode. Since the 60th Infantry was not to start its attack until 1200 hours on the 10th, the 2d Battalion's time of attack was to be sometime during the afternoon of that date. This was an important factor because it meant that the battalion would attack in broad daylight.

The battalion was worried. Attacking in daylight over the wide open terrain between Jungersdorf and D'Horn would provide the Germans with a field day; they literally would be shooting at ducks on a pond. The troops attacking across this plain would be under continuous observation from their line of departure to their objective. Added to the danger of advancing without cover was the fact that the ground was extremely soggy, so much so that the use of tanks appeared improbable. Indeed, a small ditch system midway between the two towns, which appeared particularly soft, later proved to be impassable to tanks. The panoramic view of the countryside, as seen by men of Companies E and G for five days before the attack, did not bolster their morale. (See Figure 1.)

With this situation the 2d Battalion commander went to work studying the terrain to determine how he could use it to advantage, if at all. He was confronted with three problems: how to blind the enemy's observation, how to nullify the enemy's planned defensive fires, and how to expose as few of his men as possible while crossing the plain.

The battalion staff recommended such obvious measures as the use of smoke, covering fire from small arms, and artillery support. Eventually, a combination of all of these was used to effect a highly successful attack.

While viewing the terrain, the first question confronting the commander was, "If we are hit so hard by enemy fire that we are pinned down, what cover will we have?" The answer was obvious: there was no *natural* cover available. Not content to let the matter rest so unsatisfactorily,

the battalion commander considered other means. Consulting his artillery liaison officer he told him, in effect, "I want you to help us make our own cover on that open ground. I want the heaviest artillery we can get to fire several concentrations between Jungersdorf and D'Horn. Dig us some shell holes so if the need arises we can take cover from enemy fire."

This was a request more easily made than granted. Artillery ammunition was none to plentiful. However, the artillery liaison officer did some fast talking and persuaded certain corps artillery battalions to fire several concentrations of 155-mm artillery on D'Horn and then decrease their range to bring their fire back into the open, short of D'Horn, for a concentration or two.

While this problem was being solved the 2d Battalion commander was busy with the main elements of his plan. Naturally, he decided to rely heavily on fire support of all kinds, first, to prevent observation by the enemy; second, to weaken him before the attack; and, third, to beat him down should he react violently to the attack.

On the left flank, extending towards D'Horn, a railroad track ran along the top of a 12 to 20 foot fill which started about 400 yards east of Jungersdorf. This provided excellent protection for attacking infantry against both fire and observation from the left flank. The right flank and the front constituted the main problem, presenting as they did fields of fire and good observation for the enemy in D'Horn to the front and Schlich and Merode on the right flank.

Discussion with the artillery liaison officer and the 26th Field Artillery Battalion developed the following plan:

> The towns of D'Horn, Schlich, and Merode, would receive time fire at H-hour minus 10 minutes. Then at H-hour smoke would be placed to the north of Schlich and Merode preventing any observation from those towns. The time fire on D'Horn was to continue till lifted by the leading attacking company. It would then move to a greater range on Derichsweiler.

A medium artillery battalion, the 34th Field Artillery, and the regimental cannon company were to fire on Derichsweiler where it was believed that the Germans had mortar positions.

Company H's 81-mm mortars, initially, were to supplement the artillery fires on Schlich and Merode then be prepared to give support to either one of the attacking companies as they got into D'Horn. (See Figure 1.)

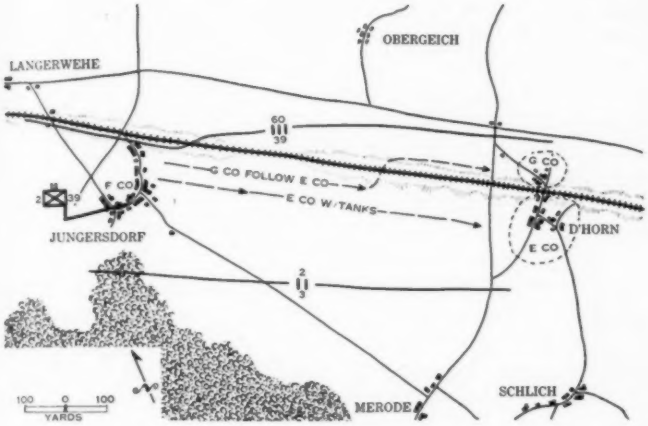
The battalion commander planned to move his battalion out with Company E leading accompanied by an attached platoon of tanks from Company A, 746th Tank Battalion. This company would head directly for D'Horn. Four to five hundred yards back Company G would follow Company E. When Company G reached a point 500 yards short of D'Horn it would move to the left, cross the railroad fill, then move on into that part of D'Horn which was to the left of the tracks. (See Map 2.)

Company F, which at the time of planning was still in Langerwehe, would move to Jungersdorf the night before the attack and remain in that town initially as battalion reserve.

The heavy weapons company would split up; a section of heavy machine guns would be attached to each of the attacking companies, E and G. Since the heavy weapons company table of organization at that time provided for two platoons of heavy machine guns, the remaining platoon would be set up in Jungersdorf to give overhead fire during the attack.

A platoon of tank destroyers which was attached to the 2d Battalion would choose covered positions in Jungersdorf to which it would move when the attack started. From these positions it would fire on previously observed targets plus any targets of opportunity.

With the main elements of his attack plan completed, the battalion commander informed his units of their missions. By devious means the supporting units began stockpiling ammunition in excess of their basic loads. Elsewhere in the battalion and its supporting and attached units a busy three days prevailed.



Map 2.

The battalion commander took his company commanders to the battalion observation post and showed them the ground over which they were to attack. Company commanders took their platoon leaders to the same point. Squad leaders from Company E enjoyed the same preview of the terrain as did many of the men of Company E, which held the ground on which the observation post was located.

With three days to go, the company commanders had ample time to acquaint everyone with the attack plan and what each unit was to do. They not only told their leaders what was to be done but showed them where they were to go, what confronted them, and how obstacles were to be surmounted.

During this time minor plans and administrative procedures were ironed out. Arrangements were made for feeding the companies after the attack, extra ammunition was issued, and the battalion obtained a supply of white phosphorus grenades to be issued for use in the house-to-house fighting that was expected in D'Horn. This grenade was selected in preference to the usual fragmentation type

because the battalion's experience had been that the Germans feared it more than the others; that it might induce surrender where the fragmentation grenade would not.

Everything was set except for H-hour, a time which would be determined by the success of the attack to be made by the 60th Infantry and elements of the 3d Armored Division on the 2d Battalion's left flank. All units were to be ready for immediate action anytime after 1200 hours, 10 December.

WAITING PERIOD

With plans made and everyone thoroughly informed, the battalion settled down to wait for the signal to push forward. Originally the feeling existed that the operation just couldn't miss. Everything was fine. The weather was clearing. Spirits in the battalion were high. However, about noon on 9 December an incident occurred that was like a spark to tinder. From then on one trouble came right after another.

The only usable route from Langerwehe to Jungersdorf was a one-way road which ran through a German farm, a large building built around a courtyard, then over the hill into Jungersdorf. This last part, exposed to the enemy, could be used only during darkness. (See Map 1.) The battalion commander had found this out personally on 5 December when he had been sniped at by a rather large gun while trying to make a run for Jungersdorf in his jeep. This one road was the supply route and it was to be used by the tanks and battalion antitank guns which were to come up the night of the 9th. It had to be kept open. However, keeping it open became a major problem. A 4.2-inch mortar platoon moved in and set up in the farmyard, digging furiously and getting set to register. Questioning elicited the information that it was to support the 60th Infantry on the left and thought that the farmyard was a perfect position for its weapons. However, after a short orientation, and a lesson on the reasons for boundaries, the chemical mortars moved out.

The battalion staff had hardly settled down when word came in that a half-track was stuck and wanted some help.

One of the 4.2-inch mortar platoon's ammunition carriers was half off the one-way road, stuck in mud two feet deep, and very effectively blocking traffic. After a little deliberation a tank was brought up to haul the half-track out. After this the battalion ammunition and pioneer platoon put down engineer tape to help guide vehicles moving up that night.

All was quiet till dark except for German artillery which had fired continuously since the 2d Battalion had taken over the position. Most of this fire was destined for friendly artillery batteries one terrain feature to the rear but a surprising number of shorts fell on the battalion itself.

At dark, troubles started again. About 1930 hours a combat command of the 3d Armored Division parked on the main road running past the battalion command post in Jungersdorf. Eighty vehicles blocked the route which was to be taken by the battalion's attached tank platoon as it came forward to its attack position. Furthermore, the combat command planned to stay in that position till the adjacent attack, in which it was to engage, jumped off the next day. This posed a problem which was solved only through the combined efforts of the battalion staff and Company F's officers. With their assistance all the battalion vehicles and attached tanks finally got through and into Jungersdorf.

No sooner had this last tangle been straightened out than the battalion commander was confronted with the problem of an officer who refused to make the coming attack. He believed it would be suicide and, furthermore, he didn't believe his men could be compelled to attack. Previously an exemplary platoon leader who had earned a Silver Star, the several days' wait, together with constant contemplation of the wide open space to be crossed, had so undermined his morale that he had lost his nerve. His attitude immediately caused a new alarm: "WHAT ABOUT THE MEN? HOW WILL THEY ACT TOMORROW?" However, since the battalion was already committed to its plans this worry was put aside, the lieutenant was sent to regimental headquarters, and the battalion command post and Company F moved into Jungersdorf and prepared for the next day's operation.

THE ATTACK

Since for several days there had been little activity, the battalion had rested and enjoyed hot meals. Physically, the outfit was ready. 10 December dawned a clear sunny day. Men occupied themselves with odd jobs and last minute preparations trying to keep their minds off the exposed plain between their line of departure and D'Horn. At 1200 hours the 60th Infantry with elements of the 3d Armored Division jumped off toward the "Geiches." Their attack was an interesting show from the 2d Battalion OP. (See Figure 1.) The area to the north and east could be seen for two miles and the whole attack was observed. A special mine exploder company led the unit of the 60th Infantry nearest the 2d Battalion boundary. Its odd looking tanks pushing tremendous metal disks in front of the tank proper, led the way toward Geich. About half-way to the town a German antitank gun got a direct hit on the leading tank. This marked the beginning of difficulties for the 60th. From then on the attack slowed and almost halted. Time passed and at 1400 hours the 2d Battalion, 39th Infantry began to be concerned about the time of its attack. Ordered to wait until the 60th Infantry had taken Geich and Obergeich, the 39th could see from the OP that it would be a considerable time before the two objectives could be taken.

At 1450 hours, the VII Corps commander stopped at the 39th Infantry CP and asked how the attack was progressing. When told that the 2d Platoon was still waiting for word from the 60th Infantry, he ordered that the battalion begin its attack at once.

After a telephone conversation between regiment and the battalion, H-hour was set for just 25 minutes later, at 1515 hours.

Word went to Companies E and G, to the tanks, the tank destroyers, mortars, and artillery. At 1505 hours the artillery started firing as planned. D'Horn, Schlich, and Merode were well covered with time fire; next, smoke was fired and started to spread and cover Schlich and Merode.

There were minor adjustments of the supporting fires, but on the whole everything went according to plan.

At 1515 hours Company E moved out of Jungersdorf and into the open. With it went the tanks. However, only two instead of the four in the platoon crossed the line of departure. The ground had been too soft and two tanks were mired in the first 50 yards in an orchard.

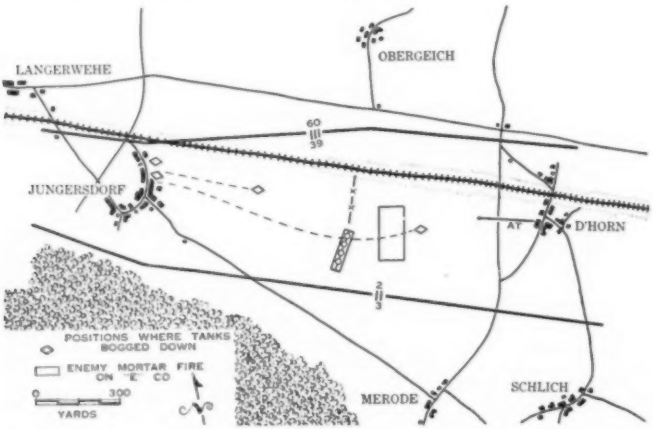
As Company E moved out, all the remaining supporting weapons began their fire. The tank destroyers opened up, Company H's heavy machine guns cut loose with overhead fire, mortars started firing at their maximum rate, and all the .50 caliber machine guns in the battalion added their fire to the already imposing array. A welcome addition to previously planned fire support were the mortar fires of the other two battalions of the regiment. This unlooked for bonus was added to the vigorous pounding being given Schlich and Merode.

Immediately after leaving Jungersdorf Company E experienced the naked feeling that comes with a complete lack of cover. However, the company advanced at a fast walk receiving only sporadic and inaccurate enemy fires initially. In a matter of minutes the company was half-way across the plain. Casualties were very light. The enemy in D'Horn was holed up against the heavy time fire bursting over the town, and the defenders of Merode and Schlich not only were enduring heavy mortar fire but were further handicapped by the well-laid smoke screen which the artillery maintained north of the two towns.

The attack was not destined to continue so perfectly. When the leading soldiers of Company E were a little past the midpoint enroute to D'Horn, word came over the radio from the artillery, "Smoke is running out; will have to stop shortly." Immediately the liaison officer and the battalion commander went to work calling everyone they knew for more smoke. But no matter where they turned the artillery returned the same answer, "Sorry." Artillery smoke ammunition was running out. To maintain a semblance of a screen for a few minutes longer the density was cut. Luckily the wind was perfect and the smoke drifted in

the right direction—toward the northwest. The battalion's 81-mm mortars then proved themselves. Taking up where the artillery left off they did a perfect job for several minutes. The effort they had made previously to procure a considerable quantity of white phosphorous ammunition paid dividends. A few minutes later, a 4.2-inch chemical mortar platoon, which had been ordered to support the attack at the last minute, added its smoke to the 81's and Merode and Schlich remained blinded throughout the remainder of the attack.

About the time the smoke originally began to thin, Company E received fairly heavy mortar fire, apparently a planned concentration, in the midst of its formation. Well disciplined, the company followed the example of its leaders and kept moving, quickly passing through the fire with only a fraction of the casualties that might have been expected had it halted. (See Map 3.)



Map 3.

By now it had crossed most of the open ground. Behind it lay a field of box mines which had been crossed without casualties. The same sogginess that prevented the satisfactory use of tanks had rendered the mines inoperative and not a single man was lost to them although several men had stepped directly on the dangerous little devices.

Also behind the company was one tank, stuck in the mud, a number of casualties awaiting litter bearers, and a group of German prisoners who were being herded to the rear.

The prisoners up to this point consisted of outpost groups which had occupied holes several hundred yards forward of D'Horn. Equipped with machine guns, they could have caused the company heavy casualties. However, these men had surrendered with little display of fight apparently because they feared that their fire would draw American tank fire.

As Company E neared D'Horn the last tank bogged down 400 yards short of the town. (See Map 3). Shortly afterwards Company E radioed, "Lift the artillery; we're moving in." Within a matter of seconds the battalion had called the artillery units and the air over the town was suddenly cleared of time fire.

The company moved in on the double. A small arms fire fight began but within half an hour Company E had cleared the town taking a sizable number of prisoners and had organized to meet any counterattack.

Meanwhile, Company G had moved out and followed the same path as Company E for about 1,200 yards then crossed over the tracks to the left without incident other than rounding up a number of prisoners and receiving sporadic small arms fire. Company G captured its section of the objective with very little resistance.

Before the artillery fire lifted, the Company H machine guns which had initially given the overhead fire support had gone out of action and moved forward to join the two companies on the objective.

The entire action had taken about one and one-half hours and was completed before darkness. As it grew dark reorganization began for the next day's attack on Schlich which was to take place when the other two battalions of the regiment moved out against Merode. The highway in the 60th Infantry's zone had been opened and permission was granted to the 2d Battalion, 39th Infantry, to use it in supplying its companies. Wire was laid along the rail-

road track and all units coordinated their defenses for the night. Until the next morning all was quiet in the 2d Battalion sector except for occasional enemy artillery fire.

ANALYSIS AND CRITICISM

In this operation one sees an attack that went according to the book. From beginning to end it had been planned and executed as smoothly as a class-room problem. Here, for once, a unit, after receiving its order, was given time to prepare and plan for the attack. There was time enough for thorough reconnaissance and terrain study by all the commanders. Not only could plans be made for the attacking units but complete and thorough coordination was obtained with those outfits supporting the attack. All targets thought to be potentially dangerous were plotted in and registered on. Finally, time permitted the troops to be informed of the plan and oriented not only orally but visually.

The division's plan for its use of the battalion was sound and the objective was properly chosen. The location of D'Horn gave attacking troops a good covered spot from which to jump off the next day in the coordinated regimental attack on Schlich and Merode. Another factor in favor of taking this objective was that it threatened the flank of the German troops holding these two towns. With such a threat—a battalion to their rear flank—the enemy gave way much quicker when pressed by the 1st and 3d Battalions in their attack the following day.

A great deal of thought went into the 2d Battalion plan of maneuver before it was finally decided to have Company E go first followed by Company G. The idea was that if Company E was pinned down only one company would thus be caught; also, there would still be a chance of helping them with the trailing company by having it immediately cross the railroad fill and advance toward D'Horn using the fill as cover from the fire holding Company E down.

The plan of supporting fires was excellent. The battalion might have taken any objective with so much support. Of-

fered plenty of fire support, the battalion commander used all of it. Too many commanders have failed to take advantage of such opportunities as were offered here. This tremendous volume of supporting fire encouraged the troops; in the open field they never slowed up, even when mortar fire hit them. By continuing to move rapidly they reached the objective in the minimum time possible and caught the defenders still in a daze from the heavy artillery pounding they had received. It appeared that the artillery kept the Germans under ground in cellars and holes since an antitank gun was found loaded and aimed directly at the battalion's zone of advance. It was ready for action but its crew either had not been able to get out to fire it or had been killed by American artillery.

In planning employment of the tanks there had been doubts as to whether they should go with the leading elements or remain in Jungersdorf and support by fire. The decision to have them accompany the lead echelon, even though none ever reached the objective, is believed to have been correct. Their presence, it is felt, kept the Germans located in the open field before D'Horn, from opening fire and disclosing their position. This enabled our troops to walk up on them and dig them out with little or no trouble. Fifteen to twenty Germans and two machine guns were taken in the field.

A final factor that kept the advance from being stopped was the effective fire and smoke on Schlich and Merode. The enemy there evidently had no observation since no fire was ever delivered from that flank although it was known definitely that enemy were present.

The 2d Battalion, in the entire attack, lost 20 men wounded. Enemy losses approximated 20 killed, 20 wounded, and 15 captured.

LESSONS

Some lessons emphasized by this operation are:

1. The coordination of all supporting fires is essential to the success of an attack. Registration beforehand is invaluable.

2. In planning and executing an attack, a better result is obtained when time allows a thorough preparation for all phases of the attack.

3. Failure to keep supply routes open and to make provisions for the control of traffic can adversely affect the tactical plan.

4. The presence of tanks has a decided psychological effect both on the troops they are supporting and the enemy they are attacking.

5. Fewer casualties are inflicted if troops keep moving when they come under mortar fire in an open area.

6. The use of smoke and the adjustment of smoke as the wind shifts is an excellent means to screen danger areas, and to reduce the effectiveness of enemy fire.

7. No matter what the situation, there is always an element of luck attached to any combat action. The wet mine fields which failed to delay the battalion's advance in this operation was an example of such luck.

Roads, Drainage, and Mud Control

Compiled by Captain James K. Polk, Corps of Engineers

In the closing months of 1944 when Allied attacks ground to a halt near the frontier of Germany the direct cause was a lack of supplies—principally gasoline and food. This resulted partially from ever-lengthening supply lines stretching hundreds of miles from the Normandy beaches across France. But the length of the supply lines was not the only reason for the shortage. It is highly probable that sufficient supplies to keep the attack rolling could have been brought up if the roads could have been maintained. However, in spite of the labor of thousands of infantry and engineer troops and more thousands of civilians who exerted all their efforts to keep them in repair, the roads failed. The vehicles of a modern army had literally pounded them to pieces.

To keep roads open is a constant struggle—a fight that starts at the ports and continues right up to the forward combat units. While engineer troops to the rear in corps and army zones are working incessantly to keep their roads open, other engineers are struggling with roads in the division area. But engineers can't do the job alone. Every divisional unit, including infantry units, must lend a hand when the necessity arises.

The amount of maintenance required on a road is directly proportional to the road type and the nature of the operations over it. A super highway requires much less maintenance than a gravel road. A division defending an area must count on maintaining the road net in its area for a long time whereas an advancing division worries about any particular stretch of road only so long as that road remains in the division zone. In many cases only one or two roads bear any great amount of traffic during an

attack, and the engineer work on them is limited to that necessary to keep them passable until corps troops move up. During defense, present doctrine calls for a minimum of at least one jeep trail per battalion. Where these do no exist, engineers normally build them; the engineers also maintain necessary additional roads and trails in the division area. However, during critical periods non-engineer units are sometimes directed to assist the engineers or to take over road maintenance completely.

ROAD CLASSIFICATION

The Corps of Engineers lists six general types of roads (see Figure 1):

PHYSICAL CHARACTERISTICS	TYPE OF SURFACE		
	PAVED: SUCH AS CONCRETE, BITUMINOUS, BRICK, OR OTHER PAVEMENT.	IMPROVED: SUCH AS GRAVEL, CRUSHED ROCK, STABILIZED SOIL, OTHER WEARING MATERIAL*	UNIMPROVED: DUSTY WHEN DRY, MUDDY WHEN WET
GOOD ROAD (GENTLE GRADES, GRADUAL CURVES, SMOOTH SURFACE, GOOD FOUNDATION)	A	C	E
POOR ROAD (STEEP GRADES, SHARP CURVES, ROUGH SURFACE OR POOR FOUNDATION)	B	D	F (PROBABLY IMPASSABLE IN WET WEATHER)

*INCLUDES ROADS OF THESE MATERIALS TREATED WITH A DUST PALLIATIVE OR COVERED BY A BITUMINOUS SURFACE TREATMENT OR SEAL COAT

Figure 1. General road types.

Any one or more of these road types may be found in a battalion or regimental sector.

TOOLS

When faced with the necessity for maintaining his own roads one of the first questions an infantry battalion commander might ask would be, "What tools do we have for the

job?" A brief listing of the tools in the battalion includes:

The infantry entrenching set carried by the battalion pioneer and ammunition platoon. In this set are shovels, (the road worker's basic tool) axes, picks, saws, and other tools; also, every combat vehicle carries a shovel and an axe.

Explosives, available in the Demolition Equipment Sets No. 5, which are scattered throughout the battalion.

The battalion can procure some items of equipment locally or can improvise them from local materials. These items include road drags, culverts, and brush mats.

For heavy work the battalion can borrow a tank dozer from the regimental tank company. If this vehicle is used, take care that the tank treads do not do more damage than existed originally. Of all vehicles that use roads those with treads are the most destructive.

MAINTENANCE PRINCIPLES

One of the first steps in the maintenance of roads is a preventive measure—traffic control. Signs are posted on roads limiting speed and imposing other restrictions on vehicles and drivers, not only to save life and limb, but also to protect the road itself.

The most common causes of road failure are ordinary wear and tear; faulty design and construction; heavy wheel and track vehicles; high speeds; climatic conditions (rains, freezing, and thawing action); and, in forward areas, damage by shell fire, demolitions, and bombing. To counteract these causes the basic principles to follow for good road maintenance are *continuous attention to drainage,* and *prompt repair of all breaks in the road's surface.* An old slogan still holds as true as ever: "Get the water off and the rock on." Infantrymen can do this job.

ORGANIZATION FOR MAINTENANCE

Two systems of organization are frequently used for road repair and maintenance. These are the gang system and the patrol system.

In the gang system a group of men (say squad size) is assigned to maintain a stretch of road. The length of the assigned portion depends to a great extent on the type of road and the amount of traffic using it. Under most conditions on type *A* or *B* roads, a squad of men can maintain five or six miles; on type *C* or *D* roads, approximately one mile; and on *E* or *F* type roads, up to a quarter of a mile. The group does its work by moving from point to point along the assigned stretch, repairing damaged parts of the road. The NCO in charge reconnoiters the road and directs the group to critical points. The group's tools and equipment consist of at least one truck, preferably dump-type, six or eight shovels and as many picks, a road drag (not needed for type *A* and *B*), and a source of gravel or crushed rock. Two-man cross-cut saws, explosives, and timber of some sort should also be available.

In the *patrol system* a small party usually of two men is assigned a short stretch of road. Two well trained men

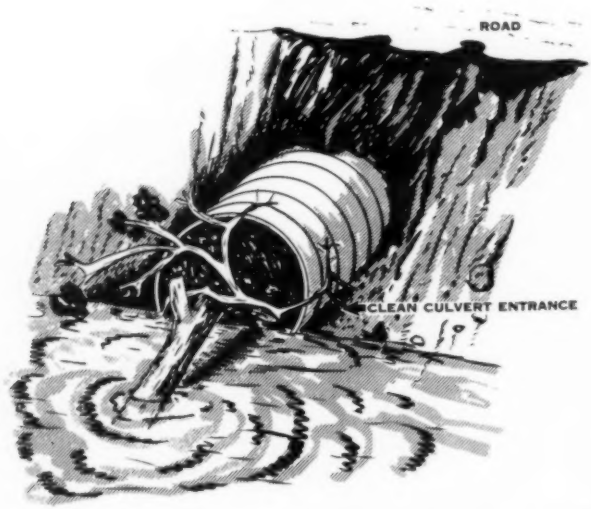


Figure 2. Good drainage depends on clean culverts and ditches.

can care for one to two miles of road that is in good condition. These men move along the road, cleaning out ditches and culverts and filling potholes. (See Figure 2.)

TYPES OF MAINTENANCE

Surface maintenance consists of eliminating ruts, washboard, and potholes to keep the surface smooth. (See Figure 3.) On gravel or earth roads, graders or road drags can do most of the work for surface maintenance.

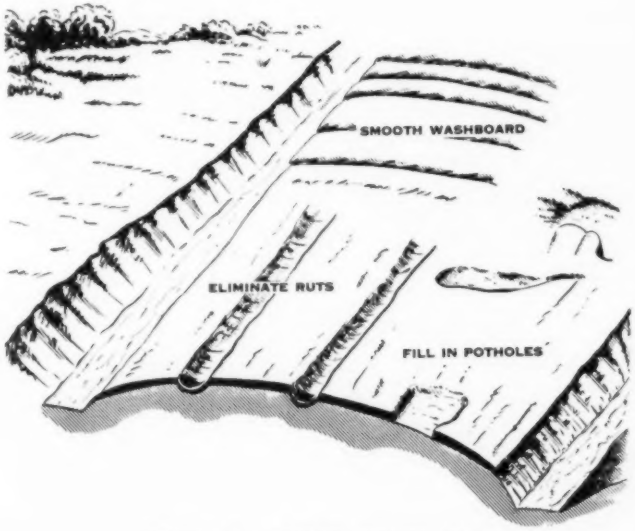


Figure 3. Surface maintenance.

These smooth the ruts and washboard and help to fill potholes. For best results with a road drag or grader the road surface should be damp. (See Figure 4.) If drags or graders are not available the maintenance troops use hand tools. If possible they fill and level the ruts and potholes with the same material as that used to build the road. In most cases this material can be found adjacent to the road.

Drainage maintenance is probably the most important type, since a dry road is usually a passable one. Failure to drain a road or an area alongside a road can very quickly

lead to impassable damage. Standing water on or beside the road saturates the material of which the road is built. Traffic passing across the spot causes a pumping action by applying and releasing pressure; this action soon softens the ground and ruins the road. It can happen even on hard surface roads.

All drainage efforts are directed toward getting water off and away from the road. For this purpose roads are built with a crown which causes water to run off to the sides. The maintenance troops keep the road surface smooth and maintain the crown so the water will run off into the side ditches.

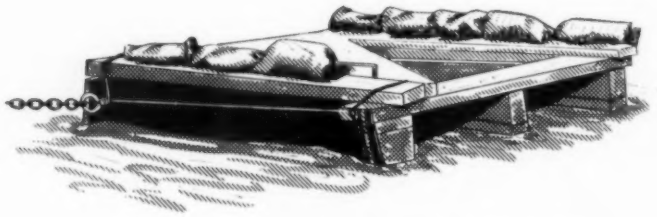


Figure 4. Road drag, a substitute for the grader.

Ditches running alongside the road take the water to where it can be discharged into a stream or other drainage line and carried away from the road. When needed, culverts are used to pass the water under the road to better drainage areas.

The maintenance troops closely check culverts and ditches to prevent clogging. (See Figure 5.) They repair places where vehicles have pulled off the road across ditches and have made ruts in which the water has formed a pool. They also repair culverts which were too close to the road surface and have been crushed by heavy vehicles. They see that a minimum of fifteen inches of well compacted material covers every culvert.

The maintenance troops also keep a close check on bridges to detect any signs of failure. They especially check the abutments, the point where road and bridge meet, which tend to fail rapidly under heavy traffic. (See Figure 6.)

They also check the bridge stringers and piers and repair any damage to them. The decking (floor) of the bridge may have a considerable amount of earth deposited on it by vehicles. The maintenance troops clean this off to reduce the dead load on the bridge. At the same time they closely examine the decking for any signs of unsound timber.

Figure 5. Typical damage resulting from clogged ditches.

Because hard-surfaced roads, such as concrete and asphalt, appear to be so substantial, many people believe these roads don't need to be drained. But like all other roads, they break up rapidly when poorly drained. With poor drainage the road shoulders soften, decreasing the support under the pavement, which in turn cracks under heavy traffic.

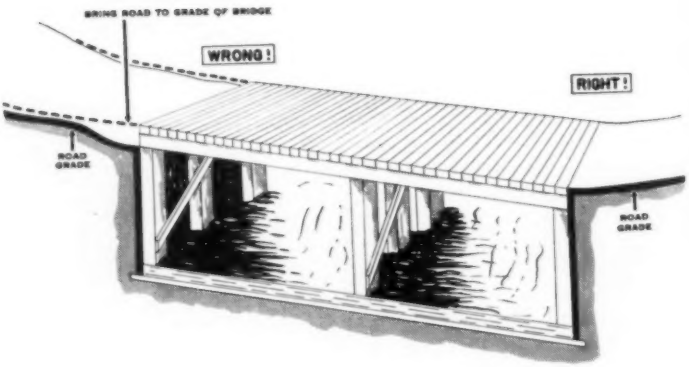


Figure 6. Bridge and road should be at the same level.

The maintenance troops remove mud which has been deposited on the surface of concrete and similar type roads. Not only does this mud cause accidents from skids, but it also hastens the failure of the road. The mud is pressed down into cracks in the road surface. The moisture softens the surface material and wheel friction and impact further aggravates the condition until more cracks occur. Then moisture gets below the surface and softens the foundation which rapidly gives way resulting in damage that may take days to repair.

in the First Army area in Frence during the last war, mud deposited on the roads caused such a critical situation in the movement of traffic that the entire effort of several engineer battalions was directed toward its removal. Orders were also issued to other units requiring them to clean the mud from roads adjacent to their bivouacs.

During winter the difficulties of maintaining roads are greatly increased, particularly during freezes and thaws. Maintenance troops anticipate freeze periods and get the drainage of all roads in the best possible shape. They drain culverts and ditches to prevent them from freezing full of water. If this precaution is not taken, the melting ice on and near the roads will cause rapid flooding during the next thaw.

While roads are frozen, maintenance crews spread sharp clean sand or cinders over the ice to give vehicles better traction. Stock piles of these materials are placed at intervals along the road, particularly at curves and steep grades.

During thaws road surfaces are extremely susceptible to damage. Responsible commanders closely control traffic speeds on parts of the road that show signs of failure. In some cases it may be necessary to completely prohibit traffic along certain stretches either by re-routing or by constructing by-passes or detours.

The maintenance troops quickly repair combat damage to roads to prevent traffic and weather from aggravating the damage. They repair potholes by squaring the sides of the hole and tamping it full of slightly damp material of the same general type as that in the original road surface. Dirt is not used for repairing potholes in hard surface roads. The best material is a good angular gravel or crushed rock, or if this is not available, a sandy clay may be used. The clay content should be small, only enough being needed to act as a binder for the sand. The finished patch is leveled to the road's normal surface.

When repairing deep craters or shell holes the maintenance troops remove all mud and loose earth and square up the sides. They fill the hole to within about six inches of the top with sand bags, heavy rock, or masonry rubble from destroyed buildings; then they spread a top layer of crushed gravel. On this type job they leave the patch slightly higher than the original road surface to allow for settling.

ROAD EXPEDIENTS

It is sometimes more economical to build a new section of road than to repair the old road. Locally available materials are used in this construction work.

Plank-tread roads can be built of timbers taken from houses or barns. In laying roads of this type fairly large timbers approximately four by ten inches by twelve feet, called sleepers, are first laid at right angles to the center line of the road, spaced about one foot apart. Flooring is

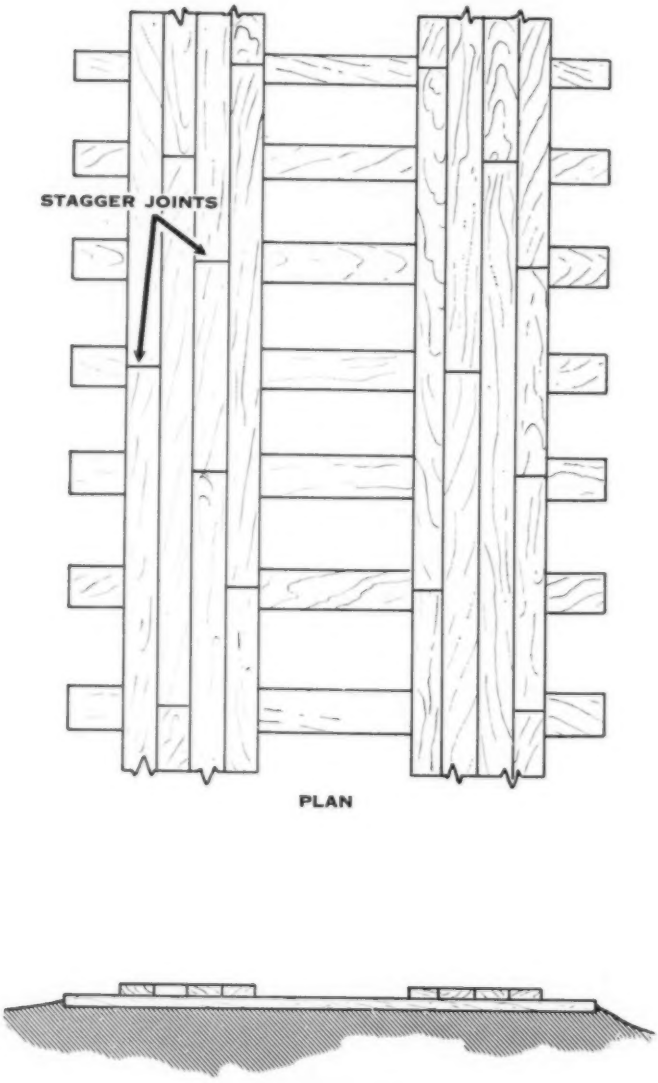


Figure 7. Plank-tread road.

laid across these sleepers and nailed down. The center of the plank-tread road is usually not floored. (See Figure 7.) The addition of curbs is highly desirable to prevent vehicles from driving off the road.

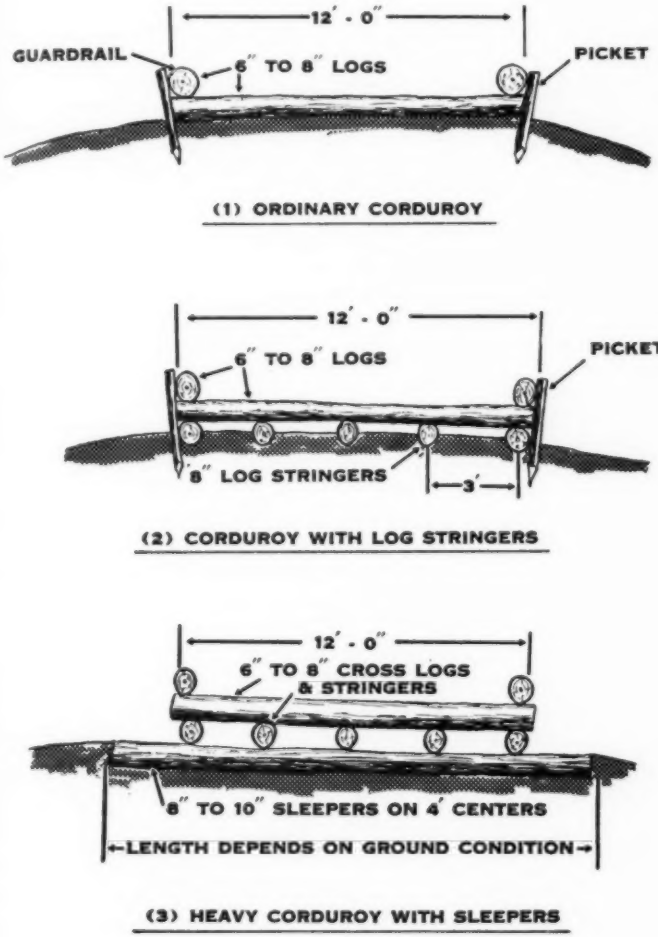


Figure 8. Construction details of three types of corduroy road.

When timber is available logs may be cut and a corduroy road built to pass vehicles over soft ground. Roads of this type are made of logs laid perpendicular to the centerline of the road. (See Figure 8.) The cross logs are six to eight inches in diameter, and are laid with butts and tips alternating. To prevent them from bucking up when vehicles pass over them, the logs are fastened down in some manner. One method is to lay guard rail logs secured to pickets driven alongside the road.

In sand a roadbed of mesh wire improves trafficability. The wire mesh is laid out and staked down taut. The use of some material (brush or grass) under the wire mesh is desirable.

In the absence of sizable trees for use in corduroy roads, brush fascines can be made of small trees, brush, or saplings. These fascines are made by binding the brush into compressed bundles with heavy wire. The bundles of brush should be at least twelve feet long and from eight to twelve inches in diameter. These are laid and staked down in the same manner as the logs in a corduroy road.

CONCLUSION

Skilled men and special equipment are not a prerequisite for maintaining or repairing a road. Tools found organically in almost any unit plus the brawn, brains, and ingenuity of the average American soldier can lick most of the problems and keep the traffic moving.

Technique of Fire for Single Light Machine Gun on Bipod Mount

Compiled by Captain Frank A. Blake, Infantry

This article discusses a new technique of fire for the single light machine gun on bipod mount, and is specifically directed at the light machine gun in the weapons squad of the rifle platoon. The technique is quite similar to that for the BAR, except that it takes full advantage of the firepower and other characteristics of the LMG. The methods discussed here have been taught at The Infantry School for the past four months. FM 23-55 does not explain the actual method of manipulating the light machine gun on the bipod mount; neither does it cover the methods for engaging targets with the single light gun—therefore this article.

1. METHOD OF FIRE WITH LMG ON BIPOD MOUNT. *a. Adjustment of Fire.* The gunner sets his sights, lays on the target, fires an *aimed burst,* and observes the strike. If the initial burst is correct, the gunner continues to fire, manipulating if necessary, until the entire target is covered. If the initial burst is *not* correctly placed, the gunner may either change the elevation and windage or select a new aiming point in order to place the next burst on the target. The "hold off" method (Kentucky windage) is used only for small corrections in elevation and deflection. Large range corrections are made by resetting the sights and relaying on the target.

b. Manipulation. This is the process of moving the gun between bursts so that the fire is properly distributed over a wide, deep, or oblique target. This is accomplished with the *LMG on bipod mount* by first adjusting fire immedi-

ately outside either flank (to insure complete coverage of the target) or on the near end of an oblique or deep target, then by selecting a series of aiming points along the path of the target and firing a succession of aimed bursts until the entire target is covered. The *gunner* observes the length and width of the beaten zone of the initial burst, and each succeeding aiming point is selected a sufficient distance from the preceding burst to allow an overlap of the beaten zones as the target is covered.

2. ENGAGEMENT OF FIELD TARGETS. *a.* FM 23-55 states that it is preferable that targets for *light machine guns on tripod mounts* be less than 50 mils in width because of limitations of the traversing mechanism. However, the single LMG on bipod mount, which is normally used in offensive operations, is not bound by any such rule. The single light machine gun will usually engage targets of opportunity that oppose the rifle platoon at short or medium ranges, and these targets will probably be more fluid and generally smaller than those which a section of machine guns would be expected to engage. While no general rule as to the width of targets to be engaged by the single light machine gun can be given—and although targets less than 50 mils in width are preferable—when the necessity arises the *single gun on bipod mount* must be prepared to engage wide targets without any subdivision with other weapons. Therefore the rifle platoon leader must consider the following factors before assigning fire missions to the LMG which require the single gun to engage very wide targets:

(1) Wide targets require the gunner to make a major shift in his position (which may affect the accuracy of his fire).

(2) Wide targets require appreciable time to traverse; that is, a continuous volume of fire will not be placed over the target.

(3) Ammunition required to engage a wide target is excessive.

3. METHOD OF ENGAGING TARGETS WITH THE SINGLE LMG. (These methods are applicable to the LMG on bipod or tripod). *a. Wide Targets.* The gunner lays just

outside the flank or on a reference point within the target area, adjusts fire, and traverses back and forth, covering the entire target until cease fire is given. (See Figure 1).

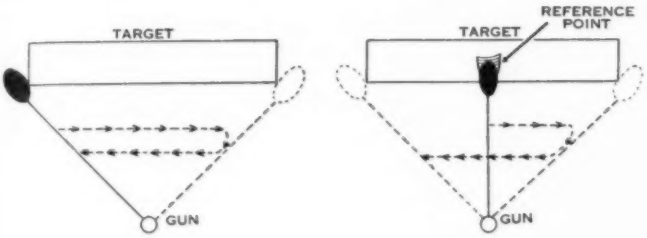


Figure 1

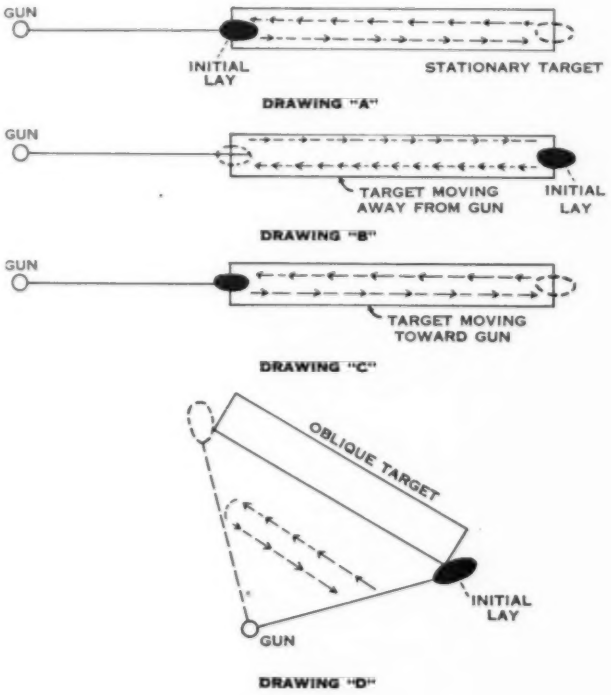


Figure 2

b. Deep Targets. The gunner uses the *range to the midpoint,* lays on the near end of the target, adjusts fire, and covers the entire target. When a reference point within the target area is used, the gunner lays on the announced reference point, adjusts fire on it, *searches down* to the *near end,* and then covers the entire target until given the command or signal to cease fire. (See drawing A, Figure 2.)

(1) *Target moving away from gun position*: The gunner lays on the *far end* with the *range to that point,* adjusts his fire, and searches down. (See drawing B, Figure 2.)

(2) *Target moving toward gun position*: The gunner lays on the *near end* with the *range to that point,* adjusts his fire, and searches up. (See drawing C, Figure 2.)

c. Oblique Targets: The gunner uses the *range to the midpoint,* lays on the *near end,* adjusts fire, then covers the entire target by traversing and searching until cease fire is given. (See drawing D, Figure 2.)

4. FIRE COMMANDS FOR SINGLE LMG (ON BIPOD OR TRIPOD). Unnecessary elements are omitted from the fire command. When the method of engaging the target is obvious because of its nature, the command "fixed, traverse, search," etc., is not given. Also, when no rate of fire is specified, the rapid rate will be fired. Below is an example fire command:

FIRE MISSION
FRONT
TROOPS EXTENDING FROM LONE TREE
RIGHT TO BLACK STUMP
500
MEDIUM
FIRE

5. LATERAL MEASUREMENT WITH LMG (BIPOD AND TRIPOD). The squad leader by use of his field glasses measures the lateral shift from the reference point to the target or flanks of the target in mils. He transmits this information to the gunner.

The gunner, using the *LMG on the tripod*: lays off this angle of shift by use of the traversing handwheel.

The gunner, using the *LMG* on the *bipod*: must make a choice of one of three methods to lay off this angle of shift. (1) The calibrated finger method. (2) The calibrated rear sight leaf method. (3) The calibrated front sight post.

a. Calibrated Finger: For a description of the calibration court and methods of using the calibrated finger for lateral measurements, see FM 23-5.

b. Calibrated Rear Sight Leaf: To utilize the rear sight leaf in laying off angles of shift, it must also be calibrated on the calbration court (See Figure 3) or by marking a point on the shoulder stock 13¼ inches in rear of the base of the leaf sight (the point at which the gunner's eye is placed so that the sight leaf subtends an angle of 50 mils at any range). The gunner places the butt end of the shoulder stock in the crotch of his right hand, thumb up, positioning his thumb on the predetermined mark, and moves his head back until his right cheek rests against his thumb—as in firing the rifle. With his eye so placed, the gunner is able to measure any target in multiples and/or subdivisions of 50 mils.

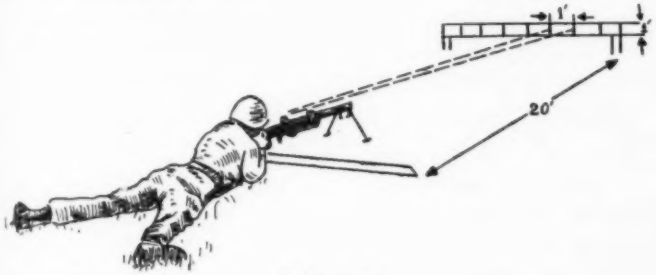


Figure 3

c. Calibrated Front Sight Post: To utilize the front sight post in laying off angles of shift, the gunner must be in the correct gunner's position. He must raise the rear sight slide so that he may sight throught the opening and along the sides of the front sight post. This method will subtend an angle of approximately 25 mils at any range. The latter, however, requires considerably more practice, and the trend of training is therefore concentrated on the rear sight leaf method.

Rifle Company in a Night Relief

For two years desk-bound Captain K had besieged the regimental commander with requests for line duty. The Old Man would grunt out a "no" or a "not yet," and K, only temporarily defeated, would return to his papers, taking time out, of course, to compose a fresh request.

Finally the Old Man was himself defeated in the face of such determination. One morning while K was struggling with a fifteenth indorsement, the buzzer summoned him to the inner sanctum where he listened happily to the following speech:

"OK, K, you've done a good job with the papers. Report to Colonel C at 3d Battalion Headquarters. He's giving you K Company effective now."

Half an hour later, having miraculously disposed of his clerical property, K was closeted with Lieutenant Colonel C in the latter's tent. The 3d Battalion was in the field.

"Well, K, glad to have you with us. Now, the situation is this——"

1. *General Situation. a.* For the last ten days, the 1st Infantry has been holding a defensive position facing northwest generally along Ochillee Creek. Boundaries, limiting points, unit positions, weapon locations, barrages, final protective lines, and command posts of pertinent units of the 1st Infantry and adjacent units are shown on the operations map.

b. The Aggressor Forces have attacked four times during this period but have been driven off each time. Their patrols have been active and have frequently infiltered the defensive positions.

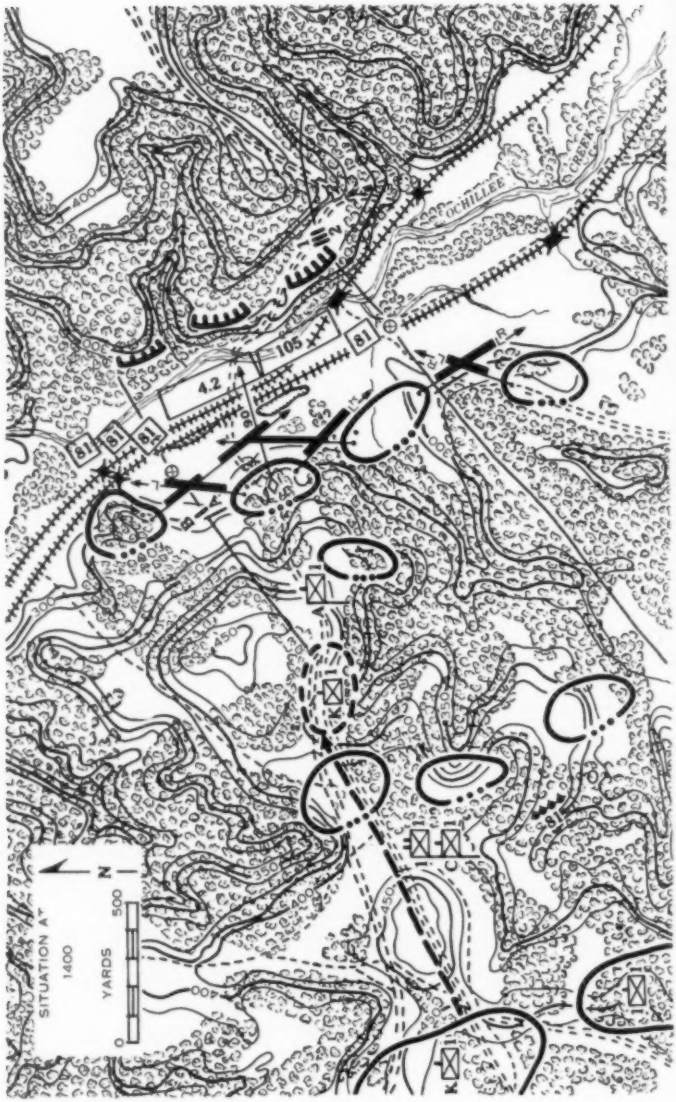
c. 1st Infantry casualties have been light, but the front-line units are showing signs of exhaustion from the strain of withstanding previous attacks and prolonged occupation of position. Their equipment and weapons need repairing and replacing.

2. *Initial Situation. a.* At 1400 today, Lieutenant Colonel 3d Battalion, 1st Infantry, issued the following order to Captain Company K: "Look at your map. We are here; Company A is there. Except for patrolling the enemy has been inactive for the past two days. Company K relieves Company A commencing 2200 tonight. Relief to be completed by 0100. Assembly area and route as shown on operation map. Company K furnishes guides from present location to forward assembly area; Company A furnishes guides for Company K from there forward to the battle position. Company commanders coordinate details. One section of Company M machine guns (which will be located in Company K area) are attached to Company K. Consider mutual exchange of crew-served weapons. Reconnaissance parties limited to two jeeps at any one time. Wire communication, fortification equipment, and excess supplies remain on position. Don't discuss relief on radio."

YOU ARE NOW CAPTAIN COMPANY K—take the ball from here. First, however, a suggestion: To get the most benefit from the problem, carefully study the following paragraphs, then when you come to the first requirement, solve it without referring to the solution. Then refer to the solution and discussion of this requirement. After studying these, solve the second requirement in a similar manner.

Par. 232, FM 7-10 (Draft)—Relief

Periodic relief of units on the battle position is made when the defense is prolonged or when units have suffered heavy casualties. A front-line rifle company may be relieved by a company from a battalion other than its own, or by a unit of different strength and organization. To maintain secrecy, the relief of a front-line unit is executed at night.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Relief plans are detailed and they are executed quickly and silently, with a minimum of confusion. Incoming leaders must know the organization of the position and the plan of defense. They normally gain this knowledge by inspecting the position during daylight and leaving some of their key personnel on the position to learn of any changes occurring after the initial reconnaissance. Unit leaders of the company being relieved are informed of the time, the sequence of the relief, and the routes and check points by which they will leave the position.

As it is relieved, each unit withdraws to the rear. There the platoons are assembled and then led by guides over previously reconnoitered routes to the company assembly area. During this movement, weapons and troops from other units normally are attached to the platoon in whose area they have been employed.

Commanders arrange for the mutual exchange of weapons which cannot be easily moved or replaced during darkness. Wire communication lines and extra supplies not essential to the relieved unit are left on the position.

Periodic reports are made by all leaders to the next higher commander. The incoming unit commander assumes responsibility for defense of the area when the major portion of his command is in position, or when he is ordered to do so by the over-all commander.

3. *First requirement.* In planning your reconnaissance, what should you do about each of the following points:

a. How soon should you make the reconnaissance and what personnel should accompany you?

b. What personnel do you plan to meet on this reconnaissance and what do you intend to coordinate with each?

c. What arrangements should you make concerning guides for the movement?

d. What orders should you give Lieutenant Executive Officer at this time?

4. *Solution to first requirement. a.* Make the reconnaissance as soon as possible after receiving the relief order so as to get full use of the remaining daylight. Take your platoon leaders, the heavy machine gun section sergeant, a guide, and, space permitting, the communication and supply sergeants.

b. Arrange to meet Captain Company A during the reconnaissance and have your party meet with their opposite members in Company A. Plan also to meet Captain Company C or his representative.

c. Have a dependable guide accompany you on the reconnaissance; he can then return on foot to learn the route in detail, and to mark it. The same guide can later bring the company forward at night to the company assembly area. Make arrangements to have guides from each platoon of Company A meet Company K at the company assembly area and move your platoons into their new positions.

d. Instruct Lieutenant Executive Officer to have attached Company M personnel join Company K at once. Order him to prepare the company for the night move.

5. *Discussion of solution to first requirement.*

a. Before making the relief you want to be sure that you and your company are thoroughly familiar with the new position. Items of special interest are:

(1) All available information of the enemy.

(2) Location of adjacent units.

(3) Exact disposition and location of all elements of Company A.

(4) Terrain to be occupied and defended.

To learn all this, you must make a reconnaissance of the area to be occupied. Therefore, delay only long enough to assemble your reconnaissance party and to give instructions

to Lieutenant Executive Officer to get the company prepared for the relief. The success of a night relief depends on a thorough reconnaissance of the new position by key members of the relieving unit. Time, transportation, and other restrictions generally determine the number in the reconnaissance group. In this instance you should consider giving, for reasons indicated, the following personnel an opportunity to make the reconnaissance:

(1) Platoon leaders: To study the terrain, detailed dispositions, and the enemy situation in daylight.

(2) Supply Sergeant: To arrange for exchange of weapons and supplies.

(3) Communication Sergeant: To learn the communication setup in Company A's area and to arrange for exchange of wire and telephone equipment.

(4) Guides: To learn the route to be followed by the company and the location of the forward assembly area.

(5) Platoon Sergeants: To get first-hand information about the new positions.

(6) Section leaders of the Weapons Platoon: To learn about their new positions and fire missions.

(7) Leader of attached heavy machine gun section: To give him an opportunity to reconnoiter the position and to arrange an exchange of weapons.

b. In planning your reconnaissance make the maximum use of the time available. Consider all the people you want to meet and with whom details of the relief must be coordinated. Arrange a meeting between members of your reconnaissance party and their opposite numbers to insure thorough cooperation and coordination in effecting the relief. Also plan to meet Captain Company C or his representative to coordinate the movement of Company K through the area of the left platoon of Company C, as indicated in the route prescribed by the battalion relief order.

c. Select your guides with an eye to their intelligence and dependability; they are a very important factor in the relief movement. The guide who accompanies you on your initial reconnaissance will later move the company along the proper route *to the forward assembly area.*

d. Prior to the reconnaissance you instruct Lieutenant Executive Officer to prepare the company for the night move. Preparations include the checking of rations, ammunition, and rolls. Platoon sergeants should be ordered to check the weapons and the individual equipment. The attached Company M personnel are sent to Company K's area immediately, so that they will be oriented and ready to move up with the platoons in whose area they will be operating.

6. *Situation, continued.* You and your party have made the reconnaissance as planned. At Company A's command post you met Captain Company A, his platoon leader, and his noncommissioned officers. He oriented you on the situation and on his dispositions. Each of your platoon leaders visited the area he was to occupy and learned the exact location of the squads and weapons. All available enemy information was passed on to your group. When the platoon leaders and company commanders reassembled at Company A's command post, final plans for the relief were made.

7. *Second requirement.* What arrangements should be made concerning each of the following:

a. Plans had already been made to have Company K guided to the forward assembly area by its own personnel, and for guides from each platoon of Company A to meet the company there and move each platoon to its assigned position. What arrangements should be made for guiding the platoons of Company A back to the company assembly area and from there to the rear?

b. You decided that you did not like the positions now occupied by the light machine guns of Company A. You want to change them and get a different sector of fire. When should you make this change?

c. You noted that crew-served weapons of Company A were in poor condition, so you decided to use your own weapons rather than exchange with Company A. When do you plan to effect the replacement of these weapons?

d. You feel that it would be a great help to your company in getting settled if liaison people from Company A were left on the position overnight. What Company A personnel should remain with Company K after the relief, and how long should they remain there?

e. What arrangements should you make with Captain Company A about local security and patrols?

f. At what time during the relief should you assume command of the area?

g. You realize that your company may be brought under enemy artillery fire, and also, that the company may encounter an enemy patrol operating behind the lines. What are your plans for these eventualities?

8. *Solution to second requirement.* *a.* You and Captain Company A arrange that the same guides from Company A who meet Company K at the company assembly area will, after bringing your company up to the battle position, then guide the platoons of Company A back to the assembly area, thence back to the rear. Since these guides belong to Company A, Captain Company A is responsible for orienting them on the route from the assembly area to the rear.

b. You do not change the light machine guns until after daylight following the relief.

c. You do one of the following:

(1) Relieve the crews, but leave the crew-served weapons in their present position overnight, making the change the following day.

(2) Time and situation permitting, make the change during daylight hours before the relief.

(3) Change the weapons during the relief, but leave the tripods and base plates in position.

d. You request that a noncommissioned officer be left in each platoon area as liaison, and that the communication sergeant of Company A be left at the company command post. You may also request that Lieutenant Executive Officer, Company A, remain. This group stays with you until tomorrow morning, then rejoins Company A.

e. You make no change in local security or patrolling, and arrange to have personnel from Company A continue the security outposts and conduct the patrols until the following day.

f. You assume command of the area when your two front-line platoons report that they are in their new positions.

g. You plan to have the company prepared to move around any artillery concentrations. Further, you plan to have a small element of the company ready to take care of any patrol ambushes while the remainder of the company continues forward.

9. *Discussion of solution to the second requirement.*

a. In a night relief, the relieving as well as the relieved unit must make use of guides to insure that no element of the unit is lost or delayed in its movement. In this situation the logical arrangement would be to use the guides who bring Company K forward. Use of capable guides in this manner by both incoming and relieved units will enable the relief to be conducted with speed, efficiency and secrecy.

b. After making your reconnaissance of Company A's defensive positions, you don't agree with Captain Company A about the light machine gun positions for the platoons. You want to place them where they can better carry out their missions. However, you do not move your machine guns into these proposed positions during darkness; you must either make the change before dark or wait until daylight the following day. After the relief is completed, you can adjust your company fire plan as you desire, pro-

viding it does not weaken or conflict with the battalion fire plan. This variance of opinion between two commanders concerning weapons positions is common. However, it is well not to make these changes until careful study indicates that such changes will strengthen, not weaken, the defense.

c. Replacement of the machine guns and mortars could be made at night if the old tripods and base plates remained in place, the relieving unit's guns being placed on them. If this is done the final protective lines and sectors of fire can be marked by stakes, and the firing data for the mortars can be written. However, it is better to replace the weapons during the day following the relief, or during daylight hours before the relief; it is extremely difficult in darkness to set the machine guns in position to cover the assigned sector of fire and final protective line. It is difficult also to emplace the 60-mm mortars so that they can fire their assigned barrage areas. Until this replacement of weapons is accomplished, Company A will take over Company K's weapons, which will be left in the rear area.

d. Liaison personnel from Company K should be left with Company A to brief Captain Company K on any activity or change that occurs after he leaves the Company A area. Liaison should be left by Company A in the area after that Company has been relieved, provided the unit is to remain in the general area. In this situation, since Company A is becoming a part of the regimental reserve, it can leave liaison with Company K. This liaison is of great help, for it assists in relieving security outposts, sending patrols, and checking communication lines; and it would also be familiar with any peculiar characteristics of the enemy. Company A liaison personnel should be returned to their own unit the next day.

e. When conducting a relief, it is essential that the entire movement of both units be made in secrecy. To maintain secrecy, it is necessary that all activities in the area continue to appear normal. A part of this normalcy is the continuation of patrol action and the employment of the same security detachments. Captain Company K should

arrange with Captain Company A to continue all local security and patrol activity. The day after the relief is completed, Company K will take over the patrols and security reliefs, temporarily oriented and guided by men from Company A.

f. An important point to be agreed upon by the two commanders involved is the time that one relinquishes command and the other takes over. The normal time for the change in command is when the bulk of the relieving forces is in position. In this case, Captains Company A and K agree that when the two front-line platoons of Company K report that they have taken over and are in position, then Captain Company K will assume command of the whole area. The actual change of command is the critical phase of the relief, for at that time there are two units in an area prepared for only one. Because an enemy attack at such a time would cause confusion, it is important that it be clearly understood who is in command. Reports by all elements of the unit as they are relieved, and reports by the relieving platoons as they get into position, will help to maintain control throughout the changeover period.

g. Captain Company K, keeping in mind all the factors of a successful night relief, including the need for secrecy and speed of movement, makes his plans to prevent disclosure of the relief and to foresee eventualities that might delay or confuse the movement. Any extended delay in the company's movement might seriously affect the success of the entire operation, since the time given for completion of the relief has been set by the battalion commander. At that set time Company K must be in full control of the battle position, and company A should be back in its rear position.

It was 0230. Captain K was in his CP drinking coffee. He felt fine. The thing had come off without a major hitch. The patrols were out, his security okay, his platoons well

fixed for the night. He had even captured a couple of prisoners for battalion. The Old Man's voice over the field phone had been almost pleasant.

Just then the first sergeant entered with a stack of papers. "Cap'n, regiment wants a fifth indorsement why Private J didn't get his shots last week."

"Great guns!" cried K. "Desk or dugout, it's the same all over." But he felt fine—just fine.

New Infantry Training Films and Training Literature

"When will the new field manuals and training films appear? Where can we get them?" These have been the Infantryman's constant queries since the war. Lack of the new manuals has created a real problem only partially alleviated by such interim expedients as training circulars.

From now on, however, more and more manuals will be rolling off the presses. A few are even now in distribution channels. FM 7-35, TANK COMPANY, INFANTRY REGIMENT, for instance, became available in August this year. Many more are to follow before the end of the year; 1950 should see the completion of all but a few of the presently projected manuals and films.

TRAINING LITERATURE

Those who want their own copies of newly printed manuals can buy most of them from the Infantry School Book Department. Even before final publication many manuals are available to interested officers and enlisted men as special texts. These are lithographed volumes, which are sold by the Book Department. Prices will be quoted on request.

The Infantry School has spent thousands of man-hours preparing training literature—new manuals, revisions, and training circulars—on practically every branch of infantry activity. The following special texts are now on sale at the Infantry School Book Department: 7-24, 7-25, 31-70, and 60-5. Special texts soon to go on sale include: 7-17, 21-75, 23-85, 23-90, 71-10, 71-20, and 71-210. No other special texts are scheduled for publication.

Following is the status of training literature as of 10 September 1949:

FM 7-10	RIFLE COMPANY	Printed manual scheduled for distribution in October 1949.
FM 7-15	HEAVY WEAPONS COMPANY	Printed manual scheduled for distribution in September 1949.
FM 7-17	THE ARMORED INFANTRY COMPANY AND BATTALION	Special text available for sale through the Infantry School Book Department in November 1949.
FM 7-20	INFANTRY BATTALION	Printed manual scheduled for distribution early in 1950.
FM 7-24	COMMUNICATION IN THE INFANTRY AND AIRBORNE DIVISIONS	Special text now on sale through the Infantry School Book Department. Printed manual scheduled for distribution in 1950.
FM 7-25	HEADQUARTERS COMPANY, INFANTRY REGIMENT	Special text now on sale through the Infantry School Book Department. Printed manual scheduled for distribution in 1950.
FM 7-30	SERVICE AND MEDICAL COMPANIES, INFANTRY REGIMENT	Printed manual scheduled for distribution in October 1949.
FM 7-35	TANK COMPANY, INFANTRY REGIMENT	Printed manual was distributed in August 1949.
FM 7-37	HEAVY MORTAR COMPANY, INFANTRY REGIMENT	Printed manual was distributed in September 1949.
FM 7-40	INFANTRY REGIMENT	Printed manual scheduled for distribution early in 1950.

FM 7-130	INFANTRY INTELLIGENCE AND RECONNAISSANCE (Directed at regimental and battalion S-2's)	Printed manual scheduled for distribution in 1950.
FM 21-5	MILITARY TRAINING AND METHODS OF INSTRUCTION (Will include TM 21-250 and TM 1-1000.)	Printed manual scheduled for distribution in 1950.
FM 21-18	FOOT MARCHES	Printed manual scheduled for distribution in 1950.
FM 21-75	COMBAT TRAINING OF THE INDIVIDUAL SOLDIER AND PATROLLING	Special text to be available for sale through the Infantry School Book Department in October 1949.
FM 22-5	DRILLS AND CEREMONIES	Printed manual scheduled for distribution in 1950.
FM 23-32	ROCKET LAUNCHERS	Printed manual scheduled for distribution in December 1949.
FM 23-85	60-MM MORTAR M19	Special text available for sale through the Infantry School Book Department in September 1949.
FM 23-90	81-MM MORTAR	Special text available for sale through the Infantry School Book Department in November 1949.
FM 23-92	4.2-INCH MORTAR	Printed manual expected to be ready for distribution in 1951. Special text, MECHANICAL TRAINING, CREW DRILL, AND GUNNER'S EXAMINATION with supplement, TARGET-GRID METHOD OF FIRE ADJUSTMENT being prepared as interim training literature. This will be available for sale through the Infantry School Book Department in October 1949.

FM 31-20	GUERRILLA WARFARE	Printed manual expected to be available in 1951.
FM 31-70	ARCTIC OPERATIONS	Special text now available for sale through the Infantry School Book Department. Printed manual expected to be available in 1951.
FM 60-5	AMPHIBIOUS OPERATIONS, BATTALION IN ASSAULT LANDINGS	Special text now available for sale through the Infantry School Book Department. Printed manual expected to be available in 1950.
FM 71-10	PATHFINDER UNITS	Printed manual scheduled for distribution in 1950.
FM 71-15	PARACHUTE MAINTENANCE COMPANY	Printed manual scheduled for distribution in 1950.
FM 71-20	AIRBORNE TECHNIQUES FOR DIVISIONAL UNITS	Special text scheduled for sale through the Infantry School Book Department in January 1950.
TM 71-210	AIR TRANSPORTABILITY OF TROOPS AND EQUIPMENT	Special text scheduled for sale through the Infantry School Book Department in December 1949.
TC.....	QUALIFICATION SCORES	At printer.
TC.....	MARKSMANSHIP COURSE A1, RIFLE M1	Final manuscript being reviewed.
TC.....	MARKSMANSHIP COURSE A1, BAR	Final manuscript being reviewed.

The material to be contained in the training circular, MARKSMANSHIP COURSE A1, RIFLE M1, appears in this issue of the QUARTERLY under the title THE NEW MARKSMANSHIP COURSE. THE MARKSMANSHIP COURSE A1, BAR, will be described in the January 1950 issue.

TRAINING FILMS

The new training films on small infantry unit tactics are primarily designed as training aids in the instruction of junior leaders and potential leaders but are also of great value in training the individual soldier.

The new films contain material that is difficult if not impossible to present effectively by any other means. They are an especially valuable medium for showing events which the average soldier experiences only in combat. They should be extremely useful to civilian components where equipment and training areas are not readily available.

To capitalize on the instructional value of the motion picture, current training films are designed to be interesting and understandable. They show *what* and *how*.

Tactical training films include:

Number	*Title*	*Status*
TF 7-1540	THE SMALL INFANTRY-TANK TEAM PART I, CHARACTERISTICS	Now available from Signal Corps Film Libraries.
TF 7-1541	THE SMALL INFANTRY-TANK TEAM PART II, ATTACK MISSION	Now available from Signal Corps Film Libraries.
TF 7-1504	THE RIFLE SQUAD IN ATTACK	Will be available from Signal Corps Film Libraries by 1 January 1950.
TF 7-1505	THE RIFLE PLATOON IN ATTACK	Will be available from Signal Corps Film Libraries by 1 January 1950.
	THE RIFLE COMPANY IN ATTACK	Now in production. Will be available from Signal Corps Film Libraries after 1 January 1950.
	THE HEAVY WEAPONS COMPANY IN ATTACK	Now in production. Will be available from Signal Corps Film Libraries after 1 January 1950.

Number	*Title*	*Status*
	THE RIFLE PLATOON IN ATTACK OF A FORTIFIED POSITION	Now in production. Will be available from Signal Corps Film Libraries after 1 January 1950.

The following training films are also designed as aids to infantry training:

TF 11-1488	COMMUNICATION IN THE INFANTRY REGIMENT	Now available from Signal Corps Film Libraries.
TF 7-1510	TROOP MOVEMENT BY AIR	Now available from Signal Corps Film Libraries.
TF 7-1522	COUNTERFIRE	Will be available from Signal Corps Film Libraries by 1 January 1950.

The following films are planned for future production:

ATTACK OF BUILT-UP AREAS

THE HEAVY MORTAR COMPANY

BATTALION IN SNOW AND EXTREME COLD

MILITARY TRAINING

THE REGIMENTAL TANK COMPANY IN ATTACK

The probable release dates on these films are not yet known. The QUARTERLY will publish information both on training films and training literature as it becomes available.

HOW TO ORDER FROM THE BOOK DEPARTMENT

Since most field manuals and special texts are classified *Restricted*, the following procedures apply on purchases made through the mail:

1. *Regular army officers or officers of civilian components on active duty:* have order countersigned by commanding officer or unit adjutant.

2. *National Guard officer:* have order approved by State Adjutant General or by an officer instructor or advisor detailed with the National Guard, who will certify that he is acquainted with the purchaser and knows him to be an officer of the National Guard.

3. *Reserve officer:* have order approved by an officer instructor detailed with the Organized Reserves, who will certify that he is acquainted with the purchaser and knows him to be an officer of the Officers' Reserve Corps.

4. *ROTC cadet:* have order approved by an officer instructor detailed with the ROTC unit, who will certify that he is acquainted with the purchaser and knows him to be an ROTC cadet.

5. *Enlisted man on active duty:* have order countersigned by immediate commanding officer.

6. *National Guard or Reserve enlisted man:* forward order through immediate commanding officer who will forward it for the approval and certification prescribed in subparagraph 2 or 3.

Address your orders to:

The Book Department
The Infantry School
Fort Benning, Georgia

Money orders or checks must accompany orders from individuals. When payment is to be made from a unit or appropriated fund, organizations may purchase on a charge basis, net 30 days. In this event, use purchase order WD Form 383A or submit with the order a letter signed by the commanding officer giving the full name of the fund from which payment is to be made.

NOTES

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